APRIL, 1942

ELECTRICAL SOUTH

MORE hotel managers are bringing in the natural air from the outside through use of HUNTER Zephair Cooling Systems. • All sections of the country are interested, whether north or south or east or west. • HUNTER engineers have studied hundreds of these different hotels and recommended certain types of installations where pleasant results have already been reported. • It now appears that civilian buyers, who are without priority rating, will not much longer be able to obtain them. • Telegraph HUNTER if you wish estimates for this season's delivery.

HUNTER FAN & VENTILATING COMPANY, INC.

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Eastern Sales Offices: New York, 72 West Street

Sales Offices:

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KANSAS CITY NEW ORLEANS PITTSBURGH ST. LOUIS
CLEVELAND DETROIT

A Great New Advance in Fluorescent Lighting

INTO every fluorescent lamp, just before completion, goes a little blob of mercury. Not too little, because the lamp needs a minimum amount to operate efficiently; not too much, because then, in time, the excess deposits itself on the surface in the form of dark streaks and splotches.

To make sure the quantity is accurately measured, Hygrade engineers have produced the "mercury bomb" —a tiny metal container of mercury, weighed to the thousandth of a gram. Heated to the bursting point before the lamp is sealed, the "bomb" explodes—releasing mercury vapor in the precise volume required for best results.

Thanks to this exclusive fluorescent development, Hygrade Lamps are unique in being virtually free of "mercury shadow"—they remain "bright to the last inch."

But the "mercury bomb" is only one of the reasons for the superiority of Hygrade Lamps.

They give more light — a greater output of lumens per watt.

They have a smoother coating texture — something you'll readily observe if you compare them with other lamps.

You can see, too, that they're more uniform in color—each lamp producing the same color of light.

And they last longer — a fact Hygrade users well know.

Good as these lamps are in *any* fixture they're even better when used in Hygrade "Miralume" fixtures — a complete "package" that's unit-engineered — lamps, fixtures and accessories made for each other by Hygrade — with every part performing in harmony with the rest.

So when you recommend Hygrade Fluorescent Lighting, you're not only doing right by your client—you're building your own name as well. If you haven't yet received our free file-size kit—containing catalogs, prices and complete technical specifications on all Hygrade Fluorescent Lighting Equipment—write today to Dept. ES4.

HYGRADE SYLVANIA CORPORATION
SALEM, MASS.

Makers of Hygrade Incandescent Lamps, Fluorescent Lamps, Fixtures, Starters, Sockets and Sylvania Radio Tubes

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Volume 22 Number 4

TODAY—4 Ways to Get Helpful Information FAST...

1 YOUR HAZARD REPRESENTATIVE . . . this long experienced electrical expert lives near you, call on him for help (without obligation) any time you want it . . . on any type of job.

2 HAZARD BOOKLETS—BULLETINS—CATALOGS . . . are all crammed with facts, diagrams, pictures, code requirements—real help in making sure you're getting the right wire for every job. Write us for any you want. 1942 Electrical Buyers Reference also carries helpful facts on HAZARD Wires and Cables on pages 103-106.

3 YOUR OWN SUPPLY HOUSE . . . they are always ready to furnish specifications, prices or any information possible that will assist you in making every job successful.

4 YOUR HAZARD DISTRICT OFFICE . . . write, telephone or telegraph the nearest following office. It is there to assist you in any way possible.

Atlanta, Ga.	1606 Rhodes-Haverty Bldg.
Birmingham, Ala.	1520 Comer Bldg.
Boston, Mass.	1100 Statler Office Bldg.
Buffalo, N. Y.	44 Victoria Blvd., Kenmore
Chicago, Ill.	20 No. Wacker Drive
Cleveland, Ohio	316 Cleveland Railway Bldg.
Dallas, Texas	P. O. Box 694
Detroit, Mich.	1709 Ford Bldg.
Los Angeles, Calif.	2450 Hunter St.
New York, N. Y.	501 Fifth Avenue
Philadelphia, Pa.	Broad Street Station Bldg.
Pittsburgh, Pa.	1317 Gulf Bldg.
San Francisco, Calif.	1662 Russ Bldg.
Seattle, Wash.	801 Northern Life Tower
St. Louis, Mo.	1410 Shell Bldg.
Washington, D. C.	547 Munsey Bldg.
Wilkes-Barre, Pa.	72 Hazel St.

on HAZARD Insulated Wires and Cables

WITH THE DAILY SCENE CHANGING so rapidly because of war, you will find it . . . more than ever . . . worth your while to check the above sources of information and news when planning a job. Although our factory is running day and night, you can be sure of immediate, careful attention. All of HAZARD'S forty years experience, plus the resources of a modern research laboratory and trained technical engineers are completely available to you.

HAZARD INSULATED WIRE WORKS
DIVISION OF THE OKONITE COMPANY
Wilkes-Barre, Pa.
Offices in Principal Cities

HAZARD
INSULATED WIRES AND CABLES

WHAT'S THE DIFFERENCE BETWEEN TRANSITE *CONDUIT* and TRANSITE *KORDUCT*?

TRANSITE KORDUCT
is ideal for locations where ducts must be "concreted in." It is identical with Transite Conduit, except that it is thinner walled and lower priced. It saves at installation because . . .
its long lengths cut down on joints, reduce the number of spacers required. And its high rate of heat dissipation cuts cable operating temperatures . . . increases system capacity.

TRANSITE CONDUIT
is for use underground or on exposed locations without a concrete casing. It can't rust or rot . . . resists weather and corrosion . . . remains unaffected by smoke or ordinary fumes . . .
TRANSITE CONDUIT
Its uniform strength and durability mean that it holds its true form under earth loads and traffic pressure. And it is low in cost . . . more economical in service than other materials of comparable strength and corrosion-resistance.

And here are characteristics that Transite Conduit and Transite Korduct have in common . . .

1. Incombustible . . . Made of asbestos and cement, Transite Ducts won't contribute to the formation of dangerous smoke, gases or fumes. When burnouts occur, they give maximum protection to adjacent cables and equipment.

2. Immune to Electrolysis . . . Transite Ducts are entirely inorganic, non-metallic, cannot be affected by electrolysis.

3. Smooth bore . . . Cable pulls and replacements are easier . . . damage to sheathings is minimized.

4. Easily installed . . . Their combination of light weight, long lengths and quickly assembled couplings speeds up work.

For details and specifications, write for Data Book DS-410. Address Johns-Manville, 22 East 40th Street, New York.

JM Johns-Manville

TRANSITE DUCTS

TRANSITE KORDUCT— for installation in concrete

TRANSITE CONDUIT— for exposed work and installation underground without a concrete encasement

LIGHTNING PROTECTION

WITH AUTOGAP ARRESTERS

RELIABLE CO-ORDINATED LIGHTNING PROTECTION

SAFEGUARD YOUR MOST TROUBLESOME SPOTS

EXTREMELY HIGH SURGE CAPACITY

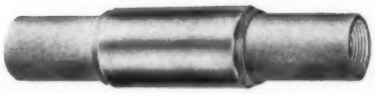
WILL NOT LOCK OUT FEEDERS

WEATHERPROOF— UNAFFECTED BY SLEET OR SNOW

MOUNTINGS FOR POLES, TRANSFORMERS OR CROSSARMS

LIKE A GUN BARREL

Steel-Reinforced to Withstand DISCHARGE



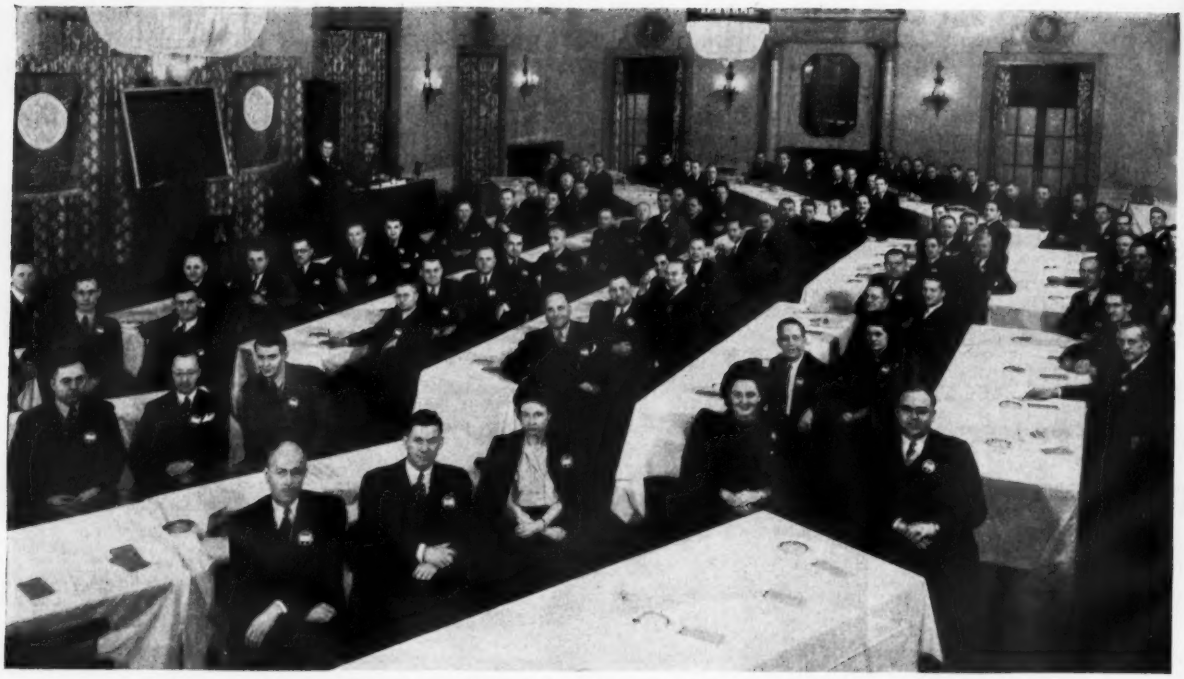
The Hubbard Autogap Arrester, on the market and available for the short span of two years, has already demonstrated its superiority. Installed, deliberately in troublesome spots, this arrester has solved the Lightning problem of a large number of users throughout the United States.

"Hang the Load on Hubbard Hardware"

Stock No.	Phase to Phase Circuit Voltage				Max. Arrester Voltage Rating	60 Cycle Test Value Kv. Rms.	Min. Impulse Breakdown Voltage 1½ Kv. Crest 40 Micro-Seconds	Weights	
	Ungrounded		Grounded					Net	Shipping
	Min.	Max.	Min.	Max.					
2300	1000	3000	1000	5000	3000	19	30	8 lbs. 3 oz.	10 lbs.
2301	3000	6000	5000	9000	6000	25	40	9 lbs. 11 oz.	10 lbs.
2302	6000	9000	9000	13800	9000	32	60	9 lbs. 11 oz.	11 lbs.

HUBBARD AND COMPANY

PITTSBURGH . . . OAKLAND CALIFORNIA . . . CHICAGO



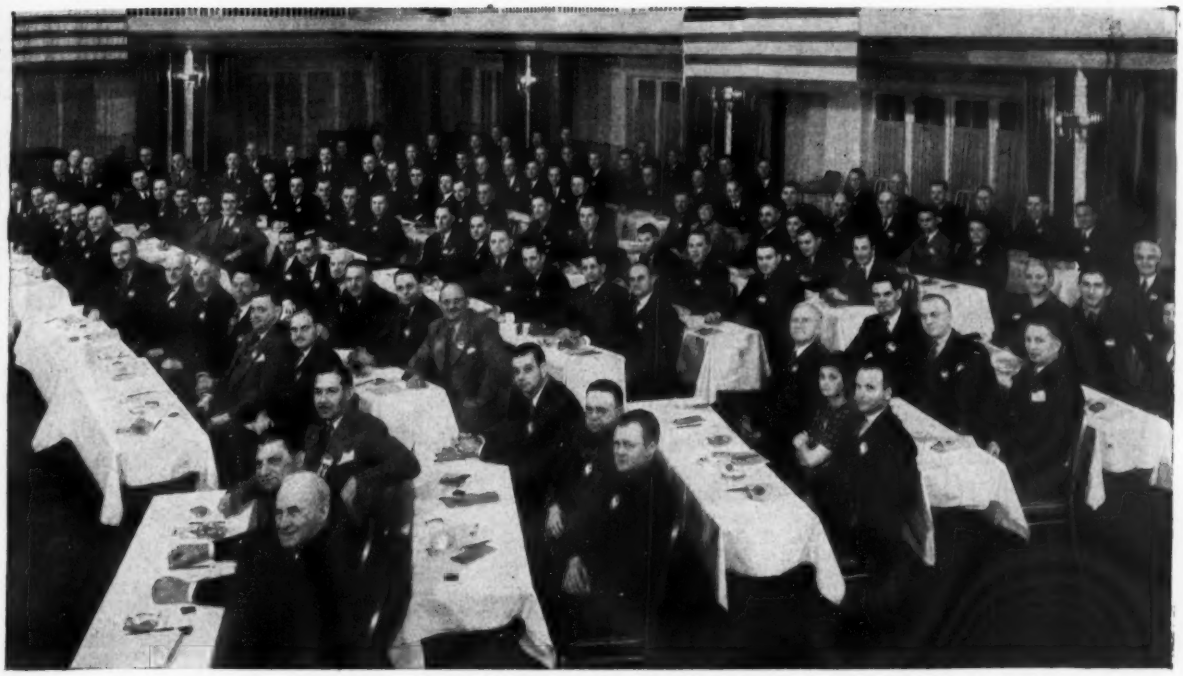
Delegates at General Electric's Retail Development League Open Forum meeting in New York enjoyed three days of spirited, sincere, and informative discussion last Jan. 26, 27, and 28.

Facing the Facts

ABOUT THE FIRST OF FEBRUARY, from every corner of the country, these retailers of General Electric appliances came to hear the facts. They received last minute reports on developments at Washington . . . probable further curtailment of production, possible "freezing" of stocks and even complete stoppage of production on some lines. All in all, it wasn't a very rosy picture.

But in the face of known facts and unfavorable conjectures, feelings were far from pessimistic. Most Dealers said: "We'll stick with the appliance business." It will mean handling additional types of merchandise, operating with a skeleton staff, increased emphasis on service, and other such expediencies.

NOTE: Since the above statement was written some of the adverse predictions made at these meetings have already come true. This does not, however, affect the broad advertising and service policy of the General Electric Company nor, we believe, the spirit of the retailers of its appliances.



Chicago R. D. L. meeting Feb. 2, 3, and 4. Many helpful suggestions were received equally enthusiastically by both the attending delegates and General Electric.

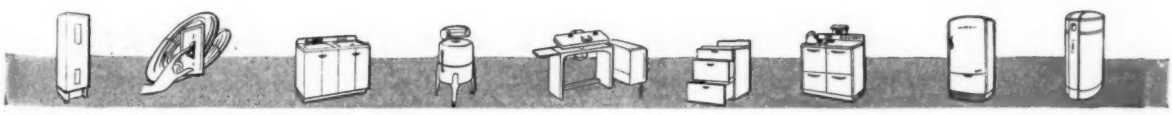
...and the Future, too

But it also means keeping good will and maintaining the Dealer's name before the public as the local headquarters for electric appliances... the place where people will go to buy the appliances they've been wanting when things get back to normal.

General Electric plans, through *continued* national advertising, to keep alive Mrs. America's interest in electric appliances and what they can do for her. And, of course, the basic structure of G-E's services to its retailers and the public will also be maintained.

General Electric, too, is facing the facts... and the future.

GENERAL ELECTRIC



There is no unguarded moment in Anaconda's "control" research; the war program and our industry can thus count on the uniform dependability in every Anaconda wire and cable.

KEEN-MINDED technicians peer intently into metallographic microscopes, day in and day out, watching, watching to see that flawless metals go into every Anaconda wire and cable that is delivered to war-vital work.

Unceasing control like this has earned its "keep". For, throughout industry and now in the army and the navy, users have learned they can lean heavily on the dependability of wires and cables bearing the Anaconda trade-mark. And that isn't all.

They have recognized Anaconda research as a source for many product improvements and for many completely new developments . . . such as Type CB* construction that outlasts ordinary shielded paper-lead cable three to one. This research is a boon to our war effort . . . it will be equally valuable to industry with the return of peace. *CB—Trade-mark Reg. U. S. Pat. Off. 42242

ANACONDA
from mine to consumer

This familiar trade-mark symbolizes the best efforts of modern research and production.

ELECTRICAL WIRES AND CABLES OF COPPER ARE THE LIFE LINES OF OUR NATION

ANACONDA WIRE & CABLE COMPANY

Subsidiary of Anaconda Copper Mining Company

GENERAL OFFICES: 25 Broadway, New York City • CHICAGO OFFICE: 20 North Wacker Drive • Sales Offices in Principal Cities

APRIL, 1942

ELECTRICAL SOUTH

Volume 22 No. 4

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Promotion Manager

W. E. COOGLER,
Production Manager

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A TYPICAL row of machine tools in a plant of the Wright Aeronautical Corporation, showing the FA Busduct used throughout the entire plant for carrying electric power.

FA BUSDUCT *helps save rubber*

MANY small and medium sized plants are being revamped for armament production. Revamping will require expansion of their electrical distribution systems for power and light.

While copper is scarce, rubber is scarcer — and the larger sizes of rubber-covered cable are increasingly hard to get.

Here's where FA Busduct fits into the picture. It not only helps conserve the rubber that is so essential to our mobile defense units — it is the *modern* method of electrical distribution — flexible, economical and convenient.

Production hours are saved by the quick connection characteristics of Plugin FA Busduct, which make it possible to move machines to any desired position — to plug in at once — and to start operation with a minimum loss of time.

Both Feeder and Plugin FA Busduct may be installed with minimum labor cost, and may be taken down and moved to new locations without appreciable loss of material. Extensions may be made readily to existing installations, which need not be disturbed.

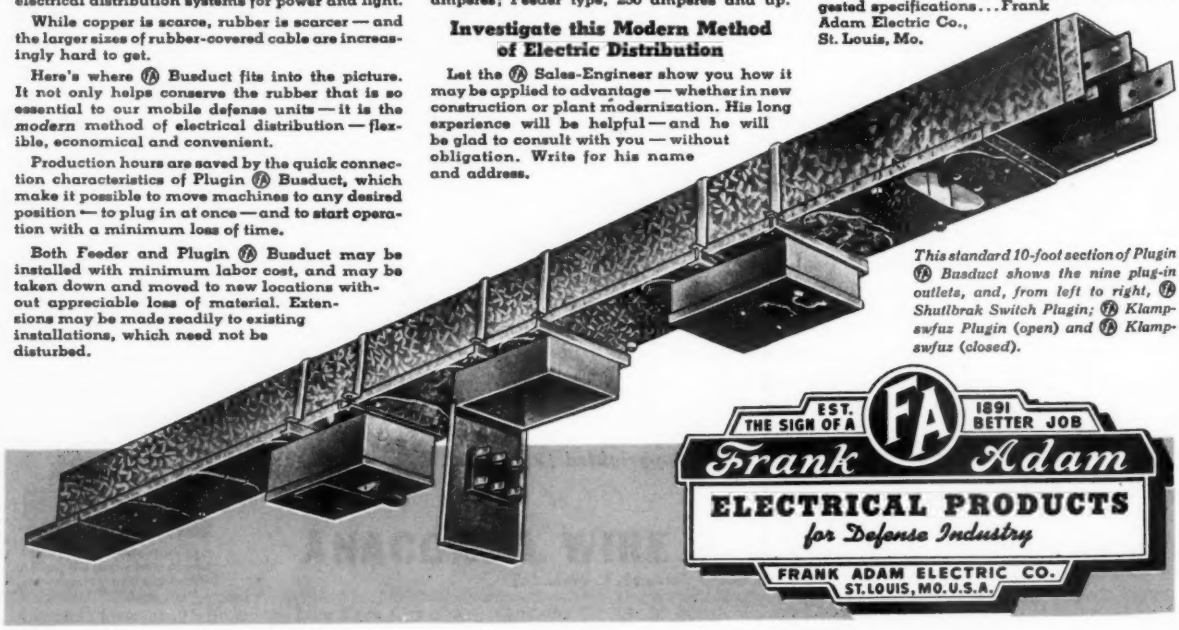
FA Busduct is designed for 2, 3 and 4-wire feeder systems; 250 volt DC, 575 volt AC, maximum. Plugin type capacities, 125 to 1,000 amperes; Feeder type, 250 amperes and up.

Investigate this Modern Method of Electric Distribution

Let the FA Sales-Engineer show you how it may be applied to advantage — whether in new construction or plant modernization. His long experience will be helpful — and he will be glad to consult with you — without obligation. Write for his name and address.

Let Us Send You Bulletin 65

which gives full details of FA Busduct installations, with photographs, diagrams and suggested specifications... Frank Adam Electric Co., St. Louis, Mo.



This standard 10-foot section of Plugin FA Busduct shows the nine plug-in outlets, and, from left to right, FA Shutlbrak Switch Plugin; FA Klampswfuz Plugin (open) and FA Klampswfuz (closed).

EST. THE SIGN OF A FA 1891 BETTER JOB

Frank Adam

ELECTRICAL PRODUCTS

for Defense Industry

FRANK ADAM ELECTRIC CO.
ST. LOUIS, MO. U.S.A.

U.S.A. Air Corps Photo

SUBCONTRACTING for OFFENSE

AMERICA must face the facts! It can win the war **only** if it provides a greatly expanded production of military goods during the rest of 1942! "Production, production and more production!" is the real battle cry of this war.

"Big business" has been converted rapidly and is reaching the production peak so essential to the war effort, but the urgent need today is the mobilizing of the thousands of machine tools scattered throughout the country in small shops — garages, machine shops, motor rewinding shops, etc. These are the facilities that represent our margin of production capacity over every other country in the world, and the responsibility of getting them utilized effectively in the war materials production system rests upon each owner.

Machinery has been placed in motion, already, enlisting the services of small producers, through sub-contracting and through the letting of prime contracts to groups of small business operators who have pooled their facilities. The objective is to get every available machine tool into production as quickly as possible.

The biggest mistake any owner of machine tools can make is to assume that he hasn't a chance of getting war contracts. There is work that he can do, but the harnessing of the capacity of small plants is one of the toughest production problems ever faced, and there are many complicating factors.

What to Do About It?

The first step of every small operator who wants war work is a complete survey of his facilities which should include a description of his business, products normally made, experience of the management and personnel, financial statements, past and present customers for reference, list of employees and their skills, description of all tools and facilities, including complete nameplate data, tolerances, etc.

Armed with this information, there are several places where the small operator can look for war work:

(1) The nearest field office of the Contract Distribution Branch of the War Production Board. (There are 115 offices scattered throughout the country.) Here a manufacturer can learn what war items are needed and get an idea of which he can make. He can study blueprints and samples. At some offices he will see exhibits of needed bits and pieces in which the prime contractors display actual parts and subassemblies they may want to farm out. Since the offices serve as a clearing house of information for Government procurement offices and prime contractors, the manufacturers should keep in close touch with the office serving his district.

(2) The Army's District Procurement offices. By writing to the Office of the Under Secretary of the War Department in Washington, the manufacturer may get a copy of "Army Purchase Information Bulletin" which contains the addresses of the various procurement offices, the type of products they buy and the procedure to be followed in getting orders.

(3) The Navy's Bureau of Supplies and Accounts. A Booklet, "Selling to the Navy" is just what its title indicates and may be obtained by writing the Bureau at the Navy Department, Washington.

(4) Local prime contractors. As firms which now have contracts become more and more "loaded" they will become increasingly interested in the facilities of every plant that can help them fill their contracts. Addresses and other information can be obtained by bona fide manufacturers at Contract Distribution Offices.

●

Specific names and addresses of subcontractors working on actual war orders are military secrets and are not given in this article. However, the editors will be pleased to assist readers in obtaining as much information as possible relating to the conversion of their facilities to war-time production.

Every effort is being made by government officials to simplify the details and eliminate red tape. To further stimulate participation by small business firms, the President has authorized the financing of war contracts through loans guaranteed by the War and Navy

Departments and the Maritime Commission. These agencies may enter into contracts with any Federal Reserve Bank, the Reconstruction Finance Corporation, or any other financial institution, guaranteeing them against loss of principle or interest on loans, discounts or advances, or on committments in connection with them, for financing war output.

In the electrical industry there are undoubtedly many machine tools that could be converted to war production but for the most part these are scattered about—one or two in one shop, a few more in another. For this reason, it is extremely doubtful if shops of this type will be in a position to handle war contracts of their own, but in many localities this difficulty has been surmounted through the organization of "production pools." In other instances, the smaller shops have joined in with a prime contractor, as for example in Baltimore, where an aggressive operator located 125 small shops having some 4,000 machine tools, signed them up, and obtained $100,000 worth of war contracts which he farms out to his group of sub-contractors.

Production Pools in Operation

The formation of production pools, probably, is the most direct approach to the problem from all viewpoints. The first step, of course, is the creation of an agency or corporation to act as the prime contractor; there must be someone to act as the trigger-man for the entire pool. This has been done in several localities—in Pittsburgh, in Denver, in Tampa, in Orange County, Florida, and in numerous other places.

Someone must take the initiative, canvass the field, line up all other possible participants, learn definitely who is available, and determine what each can do. The next step is the formation of a corporation to act as prime contractor in dealing with the government procurement agencies.

In Denver, a miscellaneous group of machine tool owners formed a corporation called the Defense Industries of Denver, and got in touch with WPB's contract distribution office.

In DeLand, Florida, a pool has been formed which is an excellent example of what can be done, for in un-industrial Florida, where practically no heavy manufacturing has been done before and machines are scarce, one of the first independent defense-work pools in the country has been organized and is actually in operation. A company was formed, facilities of the community were pooled, bids were placed, and a contract for $40,000 worth of devices obtained, which are being farmed out to all small shops in the city on the basis of equipment available.

In Tampa, an even more effective procedure has been instituted. The city and county governments contributed $5,000 for the formation of the Hillsborough County Manufacturers' Defense Pool, a corporation to act as prime contractor. These funds will be returned to the contributing agencies through a 5% assessment on contracts received by the pool, the 5% being added to their bids on any contracts. This pool includes over fifty small and medium size plants including motor shops, machine shops, etc.

Probably the best job of overall organizing of a defense manufacturing pool in the South has been done at Orlando, Florida, in the Orange County Manufacturers' Defense Pool. This pool was sponsored by the Orange County Commissioners, and one member, a machinery corporation, was designated to act as the prime contractor. A coordinator and manager was appointed, to assist in the procurement of contracts, and to administer the allocations of work to the participating members.

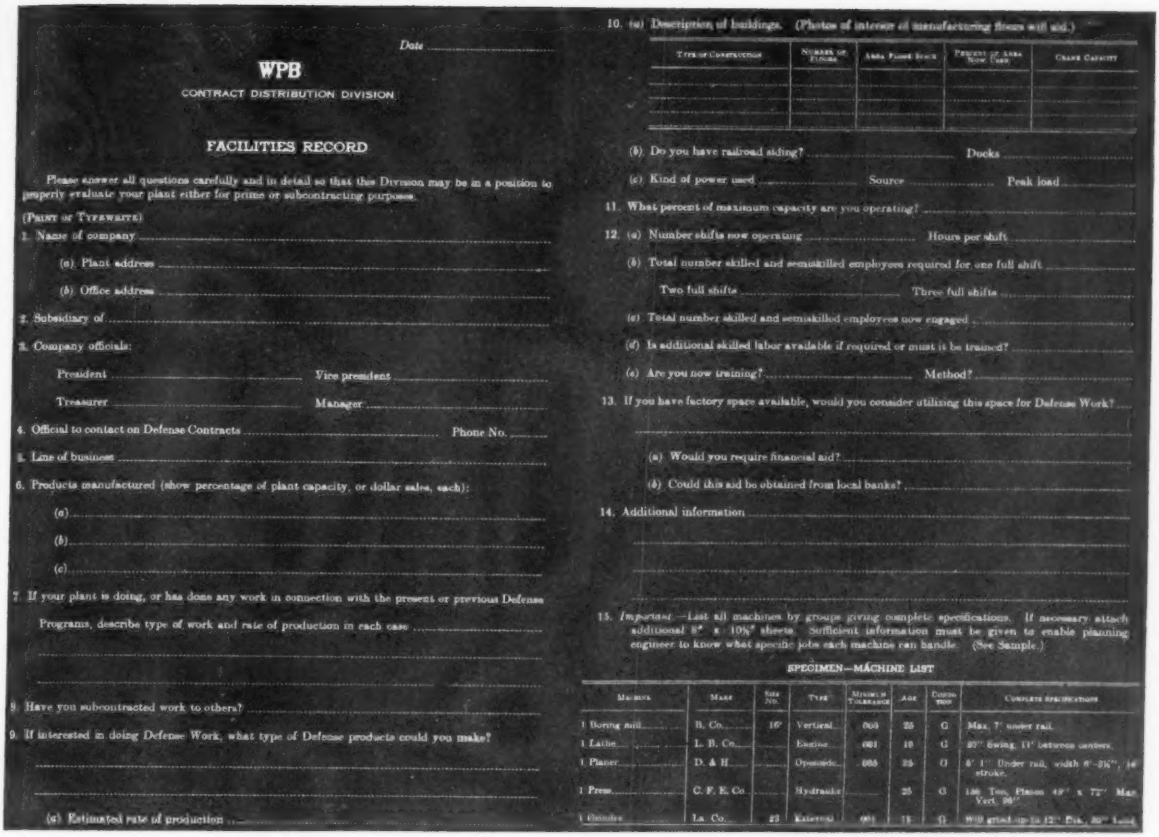
Their next step was to survey all available machinery in the area, and to completely inventory their facilities. Firms signed up include a neon sign company, a welding concern, several automotive shops and body-work garages, iron-working firms, lumber companies, box companies, boat makers, mattress companies, an aircraft manufacturer, and a variety of other operations. From the equipment survey, an extensive array of machinery was found to be available, including a large number of lathes of all sizes, milling machines, planers, shapers, miscellaneous metal working machines, power grinders, air compressors, spray painting equipment, plating machines, threading machines, drill presses, punches, shears, metal brakes, saws, jointers and a galaxy of related machines capable of handling every sort of operation in metal conversion.

To make the job complete, the pool has sponsored a trade school, training men in all types of machine work, thus assuring a source of skilled workers.

With their facilities inventory complete, the pool had a complete printed prospectus, setting forth its entire make-up, taken to Washington by the coordinator, approved by the War Production Board, and the bidding commenced. For the past six months, they have been engaged in war production.

Procedure in Organizing Pool

From this description of a successful pool, it is obvious that the first step is the assumption of the initiative by some individual or group. The procedure is to obtain, first, the enlistment of the cooperation of sufficient potential subcontractors to ensure an adequate supply of machinery. Then an inventory of all equipment is made, and a prime contractor se-



Date .....

WPB

CONTRACT DISTRIBUTION DIVISION

FACILITIES RECORD

Please answer all questions carefully and in detail so that this Division may be in a position to properly evaluate your plant either for prime or subcontracting purposes.

(Print or Typewrite)

1. Name of company .....
   (a). Plant address .....
   (b). Office address .....
2. Subsidiary of .....
3. Company officials:
   President ..... Vice president .....
   Treasurer ..... Manager .....
4. Official to contact on Defense Contracts ..... Phone No. .....
5. Line of business .....
6. Products manufactured (show percentage of plant capacity, or dollar sales, each):
   (a) .....
   (b) .....
   (c) .....
7. If your plant is doing, or has done any work in connection with the present or previous Defense Programs, describe type of work and rate of production in each case .....
8. Have you subcontracted work to others? .....
9. If interested in doing Defense Work, what type of Defense products could you make?
   (a) Estimated rate of production .....

10. (a) Description of buildings. (Photos of interior of manufacturing floors will aid.)

Type of Construction	Number of Floors	Area Floor Space	Percent of Area Now Used	Crane Capacity

(b) Do you have railroad siding? ..... Docks .....
(c) Kind of power used ..... Source ..... Peak load .....
11. What percent of maximum capacity are you operating? .....
12. (a) Number shifts now operating ..... Hours per shift .....
(b) Total number skilled and semiskilled employees required for one full shift .....
Two full shifts ..... Three full shifts .....
(c) Total number skilled and semiskilled employees now engaged .....
(d) Is additional skilled labor available if required or must it be trained? .....
(e) Are you now training? ..... Method? .....
13. If you have factory space available, would you consider utilizing this space for Defense Work? .....
(a) Would you require financial aid? .....
(b) Could this aid be obtained from local banks? .....
14. Additional information .....
15. *Important.*—List all machines by groups giving complete specifications. If necessary attach additional 8" x 10½" sheets. Sufficient information must be given to enable planning engineer to know what specific jobs each machine can handle. (See Sample.)

SPECIMEN—MACHINE LIST

Machine	Make	Size No.	Type	Minimum Tolerance	Age	Condition	Complete Specification
1 Boring mill	B. Co.	16"	Vertical	.005	25	G	Max. 7' under rail.
1 Lathe	L. B. Co.		Engine	.001	10	G	20" Swing, 11' between centers.
1 Planer	D. & H.		Opposide	.005	25	G	8' 1" Under rail, width 6'-3½", 14' stroke.
1 Press	C. F. E. Co.		Hydraulic		25	G	100 Ton, Platen 42" x 72" Max. Vert. 96"
1 Grinder	La. Co.	#3	External	.001	15	G	Will grind up to 12" Dia. 30" Long

The WPB Facilities Record form showing information on equipment which the prospective subcontractor should file with the local WPB office along with other facts on his business.

lected, either from the pool, or created in the form of a non-profit corporation. With this set-up, the spokesman, or coordinator for the pool is ready to tackle WPB.

If a WPB contract distribution branch is approached independently, the first thing asked will be an inventory of equipment, to be made out on the form illustrated. The thing to do is to have this information in advance. Beyond that, the WPB contract office acts purely as an information center. They will record the data concerning the equipment listed, and as invitations for bids come to them, they will inform the owners of the listed equipment of invitations which seem to fit their facilities. The individual or pool which has registered the facility record must then write for bid forms to whatever government branch has issued the invitation, execute them, and file them direct with the procuring branch.

The WPB contract office has available an engineer, however, to check the specifications with the potential contractor or subcontractor, and help him to determine what he can make and to formulate his bid.

Once a contract is obtained by a prime contractor, the sub-contractors can purchase raw materials from their regular sources or under the rating allowed the prime contractor. Goods turned out in sub-shops are inspected weekly, and directed to a central location for final fulfillment of the prime contract.

One thing is notable about every successful venture into war manufacturing: it is necessary to engage a competent manufacturing engineer, to help in planning production and layout — such a man in the position of coordinator or consulting engineer is highly advisable.

There are other ways in which smaller shops can get on the war work bandwagon, if they feel manufacturing impractical in their individual cases. In Columbus, Ohio, a dealer converted his show room into a technical school for the training of machinists. Another dealer converted a large part of his building to a trade school, put his salesmen out selling courses, and is doing a bang-up job for himself, his salesmen, and the war effort. Other dealers are using their space for WPB contract displays, or for assembly points for other manufacturing efforts.

Summing up, here's how to get into war production.

If your facilities are large and complete enough for you to tackle it alone, first get the WPB Facilities Record form, and make a complete inventory of all equipment mentioned, and any other you have. Also have available complete data as to your skilled man power.

Then get in touch with the nearest WPB contract distribution office, and file the record with them. Keep after them so you will be notified of invitations which are in line with your facilities. The WPB engineer will help you determine what contracts you might be able to handle; then secure the bid form from the agency doing the procurement, formulate the bids, and get ready for work.

Conserving Industrial Materials

Already industrial maintenance shops and motor rewinding shops are feeling the pinch of material shortages; here are suggestions for both conservation and substitution.

By A. C. Roe*

MATERIAL shortage is going to hit both the small and large motor repair shops hard, and tax the skill and ingenuity of the shop and engineering force to produce coils and windings of high quality, with minimum use of restricted materials and with substitute materials. Therefore, the first step a repair shop should take when a motor that requires rewinding is received is to study the job with the view-point of what can be saved and reused. The smaller the shop, the greater necessity for this step and the small shops will be in a better position to expend labor on winding details to place them in usable condition.

In this article, we will dicuss some of the items that are on the restricted list and offer suggestions for substitutes and for saving the old materials in various types of windings.

An important item that repair shops should keep in mind is that most industrial plants, large or small, will be or are already working 24 hours, six or seven days a week. This means many rewound motors will be working to the limit with shutdowns reduced to a minimum. Thus in such cases, the repair shop should consider using Class B materials for the rewinding job, as this will provide a safety factor against early breakdown from overload.

Proper use of Class B materials in a winding will in most cases permit continuous operating temperatures of 150 degrees centigrade without damage to the winding; or changing a winding from Class A to full Class B insulation means that a temperature rise of 125° C can be used, which in most cases can be considered as an 8 to 10 per cent increase in motor rating. This will also provide a foundation for an increase in the selling price of the rewound job.

The basic item in any winding is the wire used for conductors. Its shape and type of insulation, etc., will determine what can be saved and reinsulated for reuse.

New wire of any kind will be hard to obtain, particularly the square, ribbon, or large strap shapes, etc. Therefore, the question is, what can be saved? The fine wire, used in small motors, such as No. 15 or smaller, cannot be reclaimed without considerable expense.

In a pinch, the wire used for mush coils in a-c three-phase stator windings can be saved, particularly if there are two or more wires in parallel. Burn the insulation off before stripping the stator. Be sure to pack all soldered joints with fire clay to avoid glazing the solder coating on the leads.

After burning off all insulation, remove coils carefully, a few wires at a time, similar to method used in winding "partially closed" motors. When all coils have been removed, clean wires to remove carbonized insulation. Straighten wire by running it onto a reel. Next apply a thin wall of cotton or glass sleeving over the wire. Place all parallel wires in one sleeving. New coils then can be wound from the reinsulated wire.

On most low-voltage, a-c motors, 100 to 600 volts, the top and bottom slot sections can be reduced ¼-inch in length. This will provide ½-inch per turn more wire to form new leads, and will permit cutting off stub connections, and omitting the fire clay.

For open-slot, a-c stator coils made from square or ribbon insulated wire, unsweat all lead connections, and remove coils carefully from the slots, preserving the shape. Cut off all slot insulation and then soak coils in a hot cleaning compound until all insulation is soft. Then clean all insulation off the coil and each turn of wire.

Next, wipe the wire clean and dry, then retape each turn by hand with a thin paper tape .003-inch half lapped for Class A insulation or .003-inch treated glass tape half lapped, for Class B insulation. After taping the turns, the coils

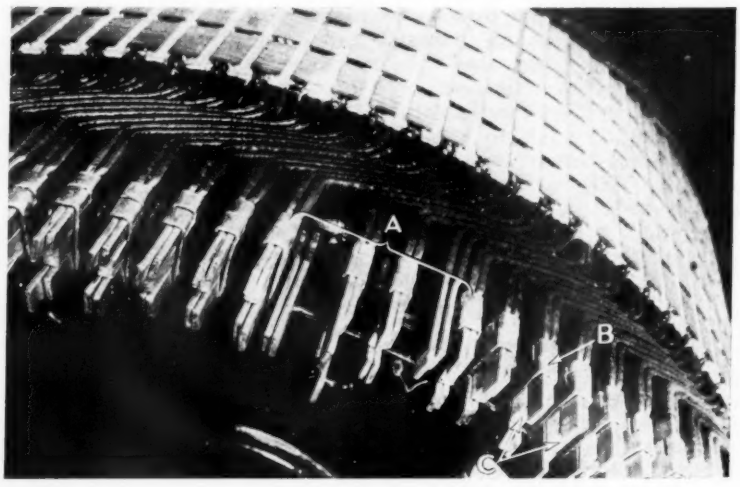


Fig. 1. Alternating current rotor windings such as this offer a number of items that can be reclaimed for further use, such as coils, copper clips indicated at "B" and the copper fillers, "C." When stripping windings of this nature, stamp coils 1, 2, 3, etc. in order removed. Check all windings for special features, such as the special coil in area marked "A," and make notes and sketches.

*Mr. Roe is a motor engineer with Westinghouse Electric and Manufacturing Company, East Pittsburgh, Penna.

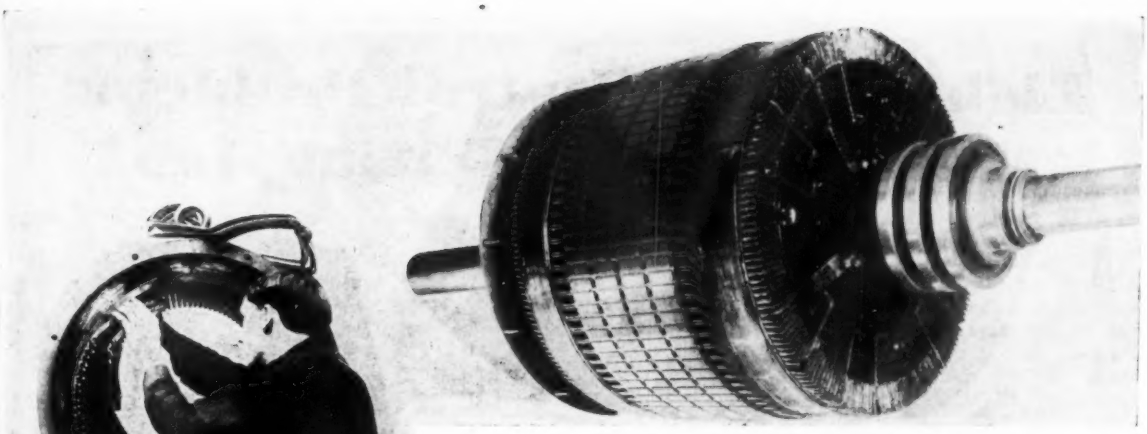


Fig. 2. (Above) Windings of this type have many items that can be reclaimed for use in other rewinding jobs. Coils, clips, special strap copper, connectors, etc., will be hard to obtain and every effort must be made to conserve supplies.

Fig. 3. (Left) All motors that are to be rewound should be stripped carefully conserving as much of the material as possible for reuse. Note that coils are being removed from the top, that is that coils are pulled down in removing them. Removal of coils can be facilitated by preheating stator or rotor four to six hours at 125 degrees C. While hot, drive out wedges from about six slots and rub paraffin over these slots, letting the melted paraffin run into the slots. Carry this procedure around the entire winding and then pry windings from the first slots. It will be found that the windings will come out quickly and easily, and without damage.

can be assembled and then insulated in the standard manner.

Paper tape .003-inch thick and in 3/8 to 1/2-inch widths can be obtained in 36-yard rolls from most large insulation wholesalers. Both the .003-inch paper and .003-inch glass tape in 36-yard rolls are small in diameter, thus small hand tape holders can be made for taping the coil turns.

Coils made from one or more turns of large copper strap, of course, can be reinsulated as this is being done at all times in most repair shops.

If there are two or more square or ribbon wires in parallel, it will not be necessary to tape each parallel strand. Instead, place thin strips of paper, or asbestos paper for Class B insulation, between strands. Then apply the tape around all strands. Don't tape bare strands together as this will increase heating.

Any shop can work out various methods of saving coils when a check-up reveals that the particular copper will be hard, or impossible, to get within a short time.

Removing Coils From Slots

There is a trick not widely known that is helpful in removing coils from open slots, particularly when coils are to be saved. Before stripping the armature or stator, preheat for four to six hours at 125° C. Then, while hot, drive out the wedges from six slots, then rub paraffin over these slots. Let the melted paraffin run into the slots. Repeat this six slots at a time until all wedges are out. Mark starting point.

Then start prying coils out of the first slots in which the paraffin was melted and it will be found that the coils come out quickly and easily. This is also useful when necessary to repair new windings that have failed on test.

The Solder Problem

The use of pure tin solder has been restricted. Thus for Class A insulated windings, the old half and half can be used, but on small a-c stator windings, the leads can be fused together with the welding flame. Thus all mush windings can have the leads fused. On larger machines, the leads can be brazed.

Thus solder can be restricted for use only on fine wires where fusing or welding of the copper together would destroy the coil leads.

Varnishes

While there is and will be a scarcity of certain oils, solvents, etc., used in the manufacture of varnishes, there will be a number of high grade varnishes available to all shops, large or small, to last for the duration.

Shellacs should be conserved as much as possible, and other cements or varnishes used when possible. For example, a clear air drying or baking varnish can be used in over 80 per cent of the applications where we now use shellac. The resin casein glue now on the market in powder form can be used for sticking insulation together, etc. This glue is easy to mix and dries quickly.

Thus, every repair shop man should ask himself before using shellac, "Why use it here? What do I want it to do that varnish or cement won't do?"

Mica Conservation

Mica must be conserved and the clever engineer, or coil winding man, will find many ways to do it, but each shop must be sure that his customer is advised beforehand, so that a competitor can't take advantage of his effort to conserve vital materials, by offering the same job without stinting on mica.

In most cases, on low-voltage equipment such as on d-c 600 volt, and on a-c up to 2200 volts, inclusive, on Class A insulation up to 100° C, continuous operation,

(*Continued on page 52*)

Lighting and Control Problems Feature Radio Wiring Job

By Nat M. Johnson

MANY TECHNICAL problems of unusual interest were encountered in the wiring and lighting of the new radio studios in Dallas, Texas, operated by stations WFAA and KGKO. The complete electrical installation was made by Superior Electric Company, Dallas, owned by H. A. Brewster. Some idea of the scope of the installation is obtained from the fact that more than 30,000 feet of shielded wire, pulled through 179 conduits in walls and floors, was used in connecting the various circuits. One hundred pairs of telephone cables for use in broadcasting and communication lead to and from the master control panel.

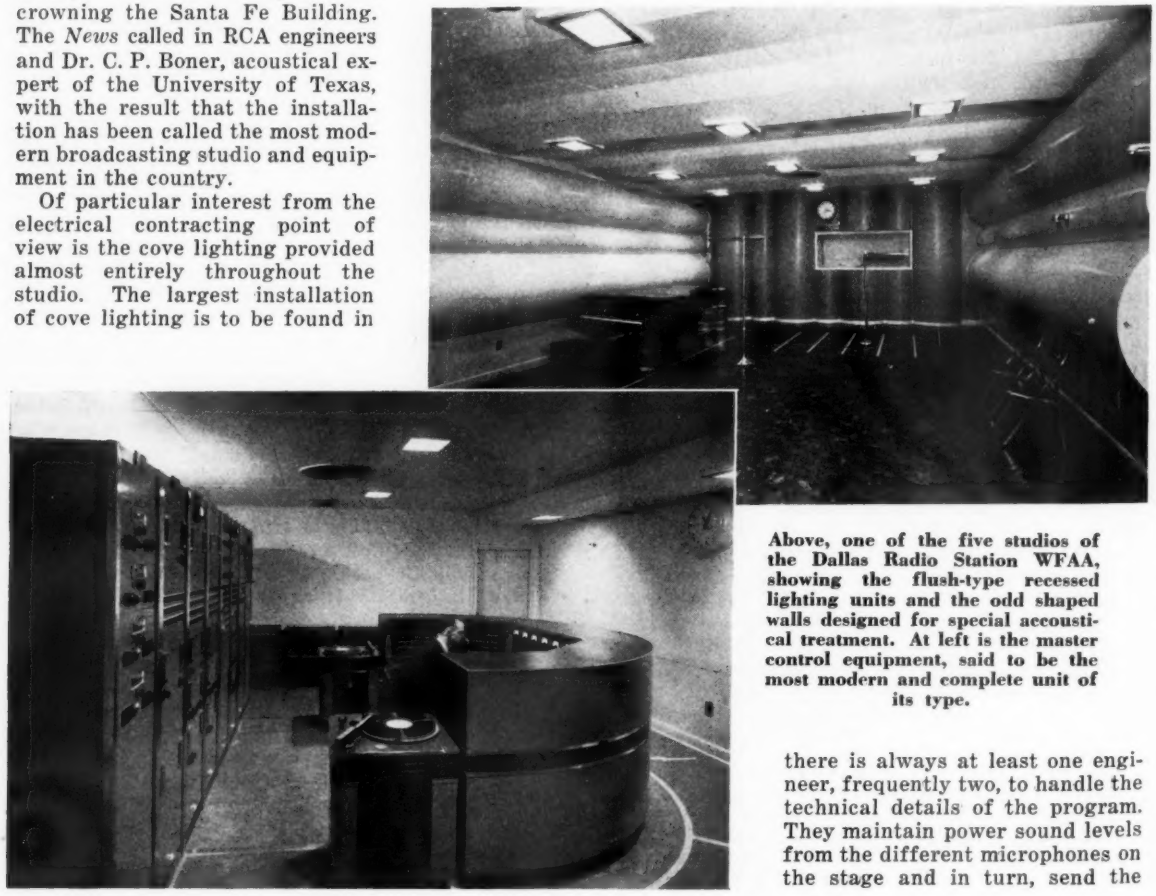
The radio studios, owned and operated by the *Dallas Morning News*, are located in a penthouse crowning the Santa Fe Building. The *News* called in RCA engineers and Dr. C. P. Boner, acoustical expert of the University of Texas, with the result that the installation has been called the most modern broadcasting studio and equipment in the country.

Of particular interest from the electrical contracting point of view is the cove lighting provided almost entirely throughout the studio. The largest installation of cove lighting is to be found in the auditorium, where the public can witness broadcasting performances from a stage large enough to accommodate a symphony orchestra. The cove lighting extends all the way around the main auditorium and is lamped with clear white lights on six-inch centers. Side walls of the auditorium are comprised of a series of slanted panels and the back wall, in which the entrance is located, also consists of panels extending the entire width of the room broken into half round sections slanted upward.

The stage is lighted by four Belsen-type border lights, using 150-watt lamps on 12-inch centers. There are red, white and blue glass reflectors to bring out the different colors. The stage curtain, which weighs some five hundred pounds, is electrically operated.

Side walls and back of stage were given a new acoustical treatment, so arranged that sound will not hit any pockets. There are V-shaped surfaces which extend into the room. This not only prevents sound pockets but will keep sounds from being thrown back into the microphone.

Control room for Studio A, which contains the auditorium, is left of the stage, with glass panel between the two rooms. In this control room, when a program is being broadcast from Studio A, there is always at least one engineer, frequently two, to handle the technical details of the program. They maintain power sound levels from the different microphones on the stage and in turn, send the



Above, one of the five studios of the Dallas Radio Station WFAA, showing the flush-type recessed lighting units and the odd shaped walls designed for special accoustical treatment. At left is the master control equipment, said to be the most modern and complete unit of its type.

The studio lighting is featured by the well-designed cove lighting, two examples of which are shown here. Above, the entrance corridor and reception desk. At right, the stage in one of the larger studios with special cove lighting around back of auditorium.

current on to the main control room. In addition, the engineer here operates switches for the stage curtain and maneuvers the 500 lights which illuminate the auditorium. He also operates spot lights in the auditorium, as well as the red, white and blue overhead stage lights.

Of the four other studios, C is the largest, being 37x28 feet. Here one would think Dr. Boner let his imagination run riot in acoustical treatment. The design includes the use of vertical barrel-type cylinders at ends and horizontal ones along sides, with alternate convex and concave ceiling treatment. The only flat surface in the room is the floor, all others being curved or slanted. This construction is said to scatter all sounds uniformly throughout the room.

Studio B, at the opposite side of the building, is almost a duplicate of C except that it is slightly smaller. Each of these studios will accommodate a large number of people for music or singing. The two smaller studios, D and E, are used for a trio, solo work and news or other broadcasting. All of these four studios are illuminated with flush-type Holophane fixtures, containing 200-watt lamps on about 10-foot centers. With the exception of E, each studio has its own control room adjoining with a glass "look-out" between. From these control rooms all sound, light and broadcasting in the various studios are controlled and sound is transmitted to the master control desk. Circuit breakers rather than fuses are used in each case.

Studio E, which adjoins the master control room, does not need its own engineer, but is handled by the man at the master control desk. This man serves very much as a train dispatcher, receiving the programs from the various studios, as well as the Red and Blue network programs, and dispatching them to the proper lines, two of which go out to the transmitting stations—WFAA near Grapevine, Texas, and KGKO, at Arlington, Texas.

Naturally, there is much responsibility on the man or men operating the master control. A half-dozen different programs may be going through this equipment at the same time. For each, there is a meter to indicate the sound level and the engineer must frequently keep his eyes on six or eight indicators at a time.

In this control room is the equipment for sending out transcriptions; also telephone lines for receiving programs or other data which is to be transmitted; and it receives from some stations programs destined for others, in which the Dallas station acts as a transfer or booster point.

The master control equipment and the four individual control consoles were designed by the WFAA-KGKO engineering staff under the direction of Raymond Collins and the equipment was constructed to their specifications by the Radio Corporation of America. This is said to be the most complete unit of its type ever constructed by the Corporation.

Back of the master control room is the engineer's shop which is equipped with electrically operated equipment—emery wheels, drill press, and other tools used in maintenance work. Here also is installed the automatic thermometer controlling air conditioning in the entire building. By the use of an indicator with eight positions, the temperature in any section of the building can be shown. This enables the supervis-

(*Continued on page 52*)

Defend Your Business Security With Better Managment

4. Good Stock Control An Essential Need

By Arthur Roberts

This is one of a series of articles which will discuss various phases of business management from the viewpoint of the electrical contractor and appliance dealer. The first article of the series appeared in the December 1941 issue of this publication.

Questions by readers relating to their specific problems in cost accounting, department records, etc. will be given prompt attention. Address such inquiries to the editors.

IN OUR FIELD studies and from our accounting commitments among electrical contractors, we find that stock control is a major problem, that less than 20 per cent utilize stock control with maximum efficiency. To sell right, you must buy right; to buy right, you must handle stock records systematically.

To get factual data on this subject for ELECTRICAL SOUTH, we discussed stock control with many contractors and find that it is a headache for these reasons: (1) they use no system at all because they assume that stock control is costly and involved; (2) they use systems badly "tailored" to the business; (3) they use too elaborate a system; and (4) the system is satisfactory but its operation is unsatisfactory.

A simple, inexpensive system of stock control fitted to the business, is essential to profitable management and we offer the basic fundamentals in this article, the recommendations based on a study of many existing systems and stock-keeping methods where systems did not exist. The dependable stock control system will comprise: (a) the recording medium, loose-leaf or card; (b) the control medium or forms; and (c) the operating routine, from the purchase order to the sales slip or job ticket and inventory check.

Cards are the most practical and economical recording medium for the electrical contractor. Filing cards, preferably 6 by 8 inches, and two card files with locks, one file for "live" cards (active), the other for "dead" cards (inactive), will serve the purpose. Cards and files should cost less than $5.

The forms should contain only essential information. We have examined many stock control systems used by electrical contractors and at least half of them are too elaborate, resulting in expensive upkeep or lax operation. In many cases, contractors who cannot afford extra help and weighted down with an elaborate stock-keeping system, discard it or handle it half-heartedly.

Keep form make-up as simple as possible. List only the data needed to check the movement of stock from the purchase order to sale or installation. Big companies use printed forms. The small contractor can make up his own forms. We show here specimen stock control forms, which should be adjusted to fit your business, retaining the fundamentals. Never fit a business to a system. Always fit the system to the business.

That, incidentally, is another reason why contractors have trouble with stock control forms. A small contractor will use forms adaptable to a big contractor's business or a big contractor will adopt a system better fitted to a department store, hence it never works right. The forms with this article give you the fundamentals of make-up. Use them "as is" or adjust them to your requirements but retain the fundamentals. They cover the operating routine necessary to adequate stock recording. Make recordings by hand. Write

ITEM_____ SIZE_____ COLOR_____ NUMBER_____ FROM_____

HOW PACKED_____ MIN._____ MAX_____ DESCRIPTION_____

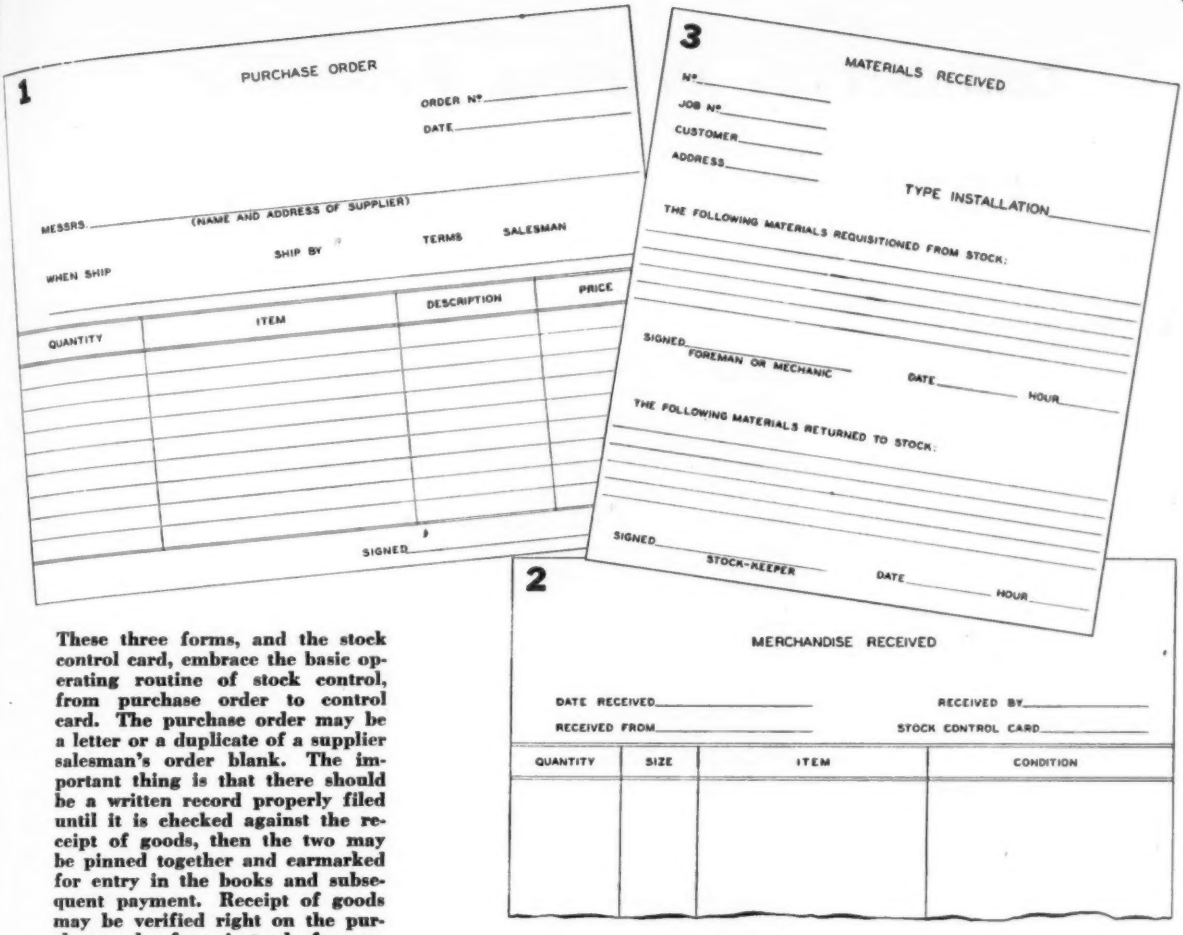
MONTHLY RECORD OF SALES

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1941													
1942													
1943													

MONTHLY RECORD OF STOCK ON HAND AND PURCHASES

STOCK														1941
REC'D														
STOCK														1942
REC'D														
STOCK														1943
REC'D														

This is a representative stock control card. File alphabetically according to item. Adjust this form to suit requirements, keeping the fundamentals. Min. and max. mean minimum and maximum stock to be carried. Record only units. Omit dollar value. Enter sales from sales records, contracts materials requisition slips or job tickets on stock control cards daily or weekly. A slanting mark (/) suffices for recording a unit sold or installed. Use pencil. Erase penciled marks at end of month and ink in numeral total. Record in all squares the same way. Start with inventory, add purchases, deduct monthly sales to get starting stock for next month. For example, stock inventory in January 1942 totaled 11 units, purchases were 6 units, January 1942 sales were 3 units, starting stock for February 1942 would be 14 units and so on. Each card shows the stock movement on an item. This also gives the item "turn" to aid management. Total the sales and purchases at end of year. The total of stock for the year is meaningless but the average stock is important so enter it at the end of the "stock" line under "Total."



1

PURCHASE ORDER

ORDER N°_____

DATE_____

MESSRS._____ (NAME AND ADDRESS OF SUPPLIER)

WHEN SHIP SHIP BY TERMS SALESMAN

QUANTITY	ITEM	DESCRIPTION	PRICE

SIGNED_____

3

MATERIALS RECEIVED

N°_____

JOB N°_____

CUSTOMER_____

ADDRESS_____

TYPE INSTALLATION_____

THE FOLLOWING MATERIALS REQUISITIONED FROM STOCK:

SIGNED_____ FOREMAN OR MECHANIC DATE_____ HOUR_____

THE FOLLOWING MATERIALS RETURNED TO STOCK:

SIGNED_____ STOCK-KEEPER DATE_____ HOUR_____

2

MERCHANDISE RECEIVED

DATE RECEIVED_____ RECEIVED BY_____

RECEIVED FROM_____ STOCK CONTROL CARD_____

QUANTITY	SIZE	ITEM	CONDITION

These three forms, and the stock control card, embrace the basic operating routine of stock control, from purchase order to control card. The purchase order may be a letter or a duplicate of a supplier salesman's order blank. The important thing is that there should be a written record properly filed until it is checked against the receipt of goods, then the two may be pinned together and earmarked for entry in the books and subsequent payment. Receipt of goods may be verified right on the purchase order form instead of a special "Merchandise received" form but receipt should be verified somehow, the clerk making the recording initialing each item. When recordings are made on stock control cards, they should be initialed. On form No. 2, this initial may be placed beside the listing, "Stock control card," for the entire bill of goods or each item initialed separately. All materials taken out of stock for jobs should be signed for; likewise, all materials returned to stock from jobs should be duly recorded. Many dollars are lost because material movement is not properly recorded. Form No. 3 is a specimen "Materials requisition."

legibly. Illegible handwriting brings many stock control systems to grief.

The third essential is operating routine. Those who start a stock control system should take inventory and enter each item's inventory on its card. File cards alphabetically. Recordings on a stock control card must disclose facts quickly. Most systems require excessive calculation to get the answer, obviously costly and a headache to the contractor short on clerical help today. Operation is slow if a file is cluttered with inactive cards. When an item has been discontinued or a card is filled, transfer it to a "dead file." Never destroy cards because they are valuable statistically.

Where does the data come from that goes on the stock control card? From the purchase orders, sales slips, materials requisition slips or job tickets—any original record that covers the receipt or disbursement of goods.

The data may be transferred from the original records to cards daily or weekly, preferably daily. If done accurately, the balance on each card will show the number of each item in stock. But no stock control system was ever that accurate. For that reason, check the card balances periodically against a physical inventory. Adjust the card balances to physical inventory.

Many contractors have asked us, "If I've got to take a physical inventory anyhow, what's the use of keeping stock control cards?" This query shows the general misunderstanding regarding stock control. A stock control system is *not* an inventory, as many contractors assume. A perpetual inventory or physical inventory gives the total *value* of stock in *dollars* at a specified time. A stock control system denotes the *sales movement* of each item in units primarily, although dollars may also be shown. To compile an inventory from stock control cards, it would be necessary to first take the unit balances on each card, multiply by the cost per unit and add up the totals on all cards. Some job to compute the value of inventory that way! On the other hand, a contractor could compute his gross profit daily with a perpetual inventory system but, in most cases, the cost would be out of proportion to the value of the information. Stock control is an aid to operating management, not necessarily to the computation of profits.

In a nutshell, stock control pro-

(*Continued on page 50*)

Industrial Wiring Practice

Part 4—A continuation of the discussion of voltage drop calculations with special consideration of load power factor as well as characteristics of the feeder circuit itself.

By B. Z. Segall

ALL OF THE WIRING calculations in Part 3 of this series (see March 1942 issue) involved the circuit conditions for the wiring system itself. What does this voltage drop represent as far as the actual generated, delivery, service, feeder or branch circuit voltage is concerned? In other words, for any one voltage applied to the feed end of a circuit, what will be the utilization voltage available for the equipment attached at the load end of the circuit? Now, in addition to the inherent characteristics of the circuit itself shown by Figure 5, (see March 1942 issue) the characteristics of the load itself must be considered.

Voltage Drop Calculations

Suppose the circuit under consideration, 2-wire, No. 4/0 Type RH open wiring, is to supply an incandescent lighting load of approximately 100% power factor. In addition, it will be assumed that this will be an industrial plant and that only 240 volt lamps will be installed. If 240 volts are to be supplied to this load, what will be the actual voltage conditions at the line end of the feeder for a total load of 144 500-watt incandescent lamps to be fed from branch circuits of a distribution cabinet installed at the end of the feeder?

The total load will be 144 x 500 = 72,000 watts. At 240 volts this will be 72,000/240 = 300 amperes or slightly less than full load capacity of the feeders. Figure 6 shows the vector diagrams for these conditions of loading and since the load itself is essentially 100% PF. the current vector coincides with the voltage vector. It should be noted that both vectors are drawn to scale but the scales are different for each vector. This system will not interfere with the final results as long as the scales are adhered to for their respective representations as will be shown in the following discussion.

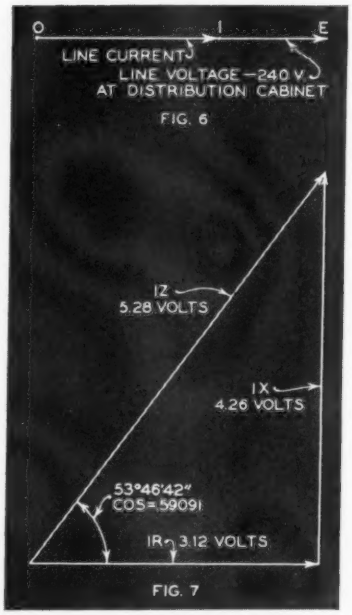


Fig. 6. Vector diagram for 100% PF load of 144 500-watt incandescent lamps. Line current of 300 amperes is in phase with voltage. Fig. 7. Vector diagram for 4/0, two-wire feeder for 144 500-watt incandescent lamp load. Impedance and reactance values are based on open wiring. Values of voltage drop are shown in the diagram.

Figure 7 shows the vector diagram for the wiring circuit conditions drawn to the same scale as in Figure 5 but for a load of 300 amperes instead of 358 amperes full load. Under these conditions the feeder IR drop = 300 x .052 x .2 = 3.12 volts and the IX drop = 300 x .071 x .2 = 4.26 volts. The IZ drop by calculation and measurement is 5.28 volts. As a check the inherent power factor of the feeder is 3.12/5.28 x 100% = 59.09%.

Figure 8 shows a combination of Figures 6 and 7 with Figure 7 added to Figure 6 using the voltage scale of Figure 6. The addition of the feeder diagram to the same scale as the load diagram must be made at a very large scale if all results are to be obtained graphically. The use of two simple trigonometric functions and one rule of geometry, already illustrated in this discussion, will give very accurate practical results. Thus for the above conditions, the actual supply voltage, E, required for 240 volts at the distribution cabinet will be:

(See top of next page)

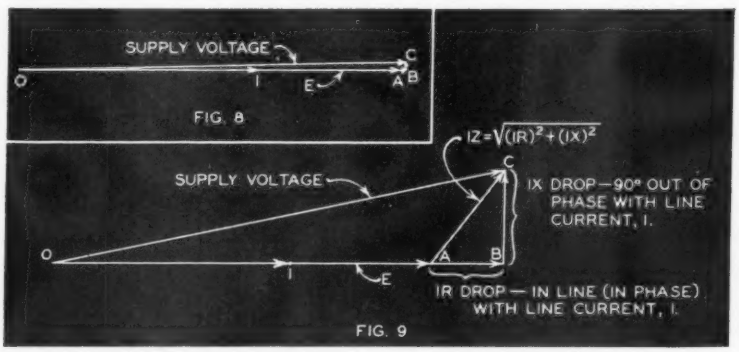


Fig. 8. The data of Figs. 6 and 7 have been combined in this diagram. Fig. 9, below, is an exaggeration of Fig. 8 to show the relationship of line current, load voltage, supply voltage, and the voltage drop.

*Mr. Segall is associated with the engineering department of New Orleans Public Service, Inc., New Orleans, Louisiana.

Throughout this series of articles, all references to the "Code" refer to the National Electrical Code, 1940 Edition. Copies of the Code will be mailed promptly upon receipt of 10c. Address requests to ELECTRICAL SOUTH, Grant Bldg., Atlanta, Ga.

$$\text{Supply E} = \sqrt{(\text{Load E} \times \cos\theta + \text{IR})^2 + (\text{Load E} \times \sin\theta + \text{IX})^2}$$
$$= \sqrt{(240 \times \cos 0^\circ + 3.12)^2 + (240 \times \sin 0^\circ + 4.26)^2}$$
$$= \sqrt{(240 \times 1 + 3.12)^2 + (240 \times 0 + 4.26)^2}$$
$$= \sqrt{(243.12)^2 + (4.26)^2} = \sqrt{59{,}125.5} = 243.15 \text{ volts}$$

where θ is the power factor angle.

Thus 243.15 volts applied to the feeder will insure a minimum of 240 volts at the end of the feeder for operation of the 144 five hundred watt incandescent lamps. It should be further noted that actually the combination circuit shows that the power factor at the load is not 100% due to the slight shift in voltage caused by the line drops. The actual angular shift related to the supply voltage is found from the formula:

$$\text{Cosine of angular shift} = \frac{\text{Load Voltage} + (\text{IR} \times \cos\theta) + (\text{IX} \times \cos 90^\circ - \theta)}{\text{Supply Voltage}}$$
$$= \frac{240 + (3.12 \times 1) + (4.26 \times 0)}{243.15}$$
$$= 243.12 / 243.15 = .99988$$

The angular displacement is about 1°; the load voltage lags the supply voltage by that amount. Of further interest is the fact, that for all practical purposes, the supply voltage required is the load voltage arithmetically added to the resistance drop, i. e., 240 + 3.12 = 243.12 volts.

To further illustrate some pertinent facts relative to the relation of the voltage drops to the circuit voltage and current, Figure 9 shows the conditions of Figure 8 but with the IR and IX values greatly exaggerated. It should be noted that the IR drop is drawn in line with the line current (i. e., in phase) and the IX drop 90° out of phase (i. e., perpendicular) to the line current.

The effect of the load power factor on these calculations can be shown by repeating the calculations for a connected load having some power factor less than 100%. Assume a single phase motor load having a total current draft of 300 amperes but at a power factor of 50%. Figure 10 shows the vector diagram for these conditions. The current and voltage vectors are still the same length as those of Figure 6 but now the current vector is displaced by an angle of 60° with respect to the voltage vector. The angle 60° corresponds to the power factor of 50%, i. e., the cosine of 60° is .5 or expressed as a percentage for the power factor value is .5 x 100% or 50%.

The IR, IX and IZ drops for the circuit wiring itself will not change but its relation to the line voltage will be different from that shown by Figure 8. The IR drop must always be shown in phase with the line current and the IX drop 90° out of phase, as stated above. Figure 11 illustrates the vector relations with the IR, IX and IZ values again exaggerated for clarity. Figure 11, however, cannot be utilized to obtain the actual values for the supply voltage or angular shift between the supply and line voltage at the distribution cabinet since two different scales have been used for the construction of the diagram.

The mathematical solution will again be used as outlined above, substituting proper values for the cosine and sine of 60°:

$$\text{Supply E} = \sqrt{(\text{Load E} \times \cos\theta + \text{IR})^2 + (\text{Load E} \times \sin\theta + \text{IX})^2}$$
$$= \sqrt{(240 \times .5 + 3.12)^2 + (240 \times .866 + 4.26)^2}$$
$$= \sqrt{(123.12)^2 + (212.10)^2} = \sqrt{60{,}144.9} = 245.25 \text{ volts}$$

Thus it will be seen that the lower power factor causes even a greater line loss as now it is necessary to have approximately two more volts at the supply point to insure 240 volts at the end of the feeder.

The cosine of the angular shift = (240 + 3.12 x .5 + 4.26 x .866) /245.25 = 245.24/245.25 = .99996. The angular displacement is approximately a half degree and the supply voltage now lags the load voltage.

(Continued on page 48)

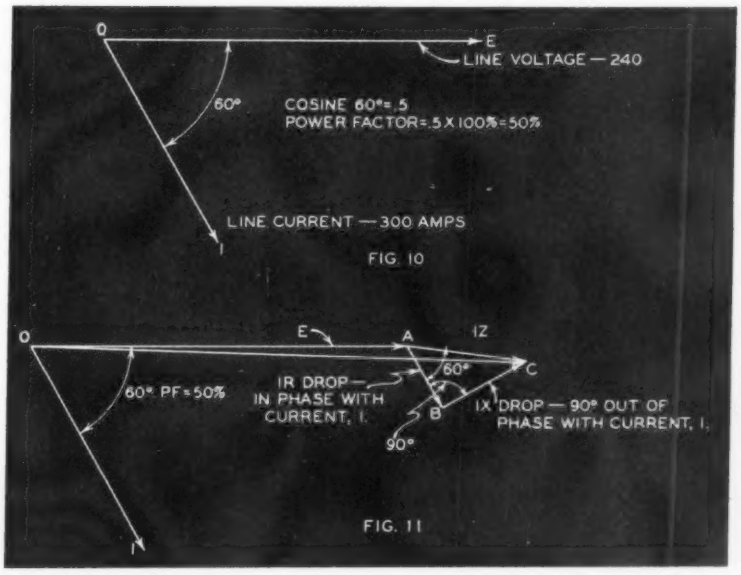


Fig. 10. This vector diagram shows the relationship of voltage and current in load having a 50% power factor. Fig. 11, below, shows the same diagram with the feeder voltage drops superimposed in order to obtain the supply voltage necessary to maintain 240 volts at the load. In this diagram, as in Fig. 9, the voltage drop diagram is exaggerated in relation to the load and supply voltages in order to show the relationship between the various components.

Chattanooga Electrical Center Renders War-time Service

PLANNED for peace-time promotion of electrical service, the recently completed "Electrical Center" of the Chattanooga Electrical Power Board is already being utilized to advantage to promote civilian defense activities.

Designed to promote a more abundant use of electrical service in the TVA area, and to help every electrical customer obtain maximum efficiency and convenience from his electrical equipment, the Electrical Center holds great promise for the electrical development of the TVA area when the emergency conditions are over.

Because of the fact that the Electrical Center was completed after war had been declared, the management felt that a formal opening would be inappropriate. Yet forty-five thousand people visited the Electrical Center during the first week it was open.

The Electrical Center has many interesting features including a Merchandise Mart, a complete Electrical Home, a Lighting Conditioning Center and a Home Service Center. At the present time a considerable part of these facilities are being utilized to advantage as a "Center" for local civilian defense activities. Classes in nutrition and food conservation are being conducted in the model kitchens and the auditorium of the Home Service Center and other meeting rooms are being made available for meetings of various groups. Classes in safety and first aid and appliance conservation are being conducted by Power Board employees.

Black-out procedure will be taught to groups and instructions will be given concerning lighting and obscuration of light during air raid black-outs. The Board is now preparing blackout instructional booklets which will be published and distributed to all citizens. Demonstration of draperies and black-out materials will be made in the Electric Home.

The advertising and display facilities of the Electrical Center will be devoted to Civilian Defense Council activities. The Council has a huge task in getting its story across to the citizens and the windows and interior of the Center which are viewed by thousands of eyes will provide effective assistance through displays.

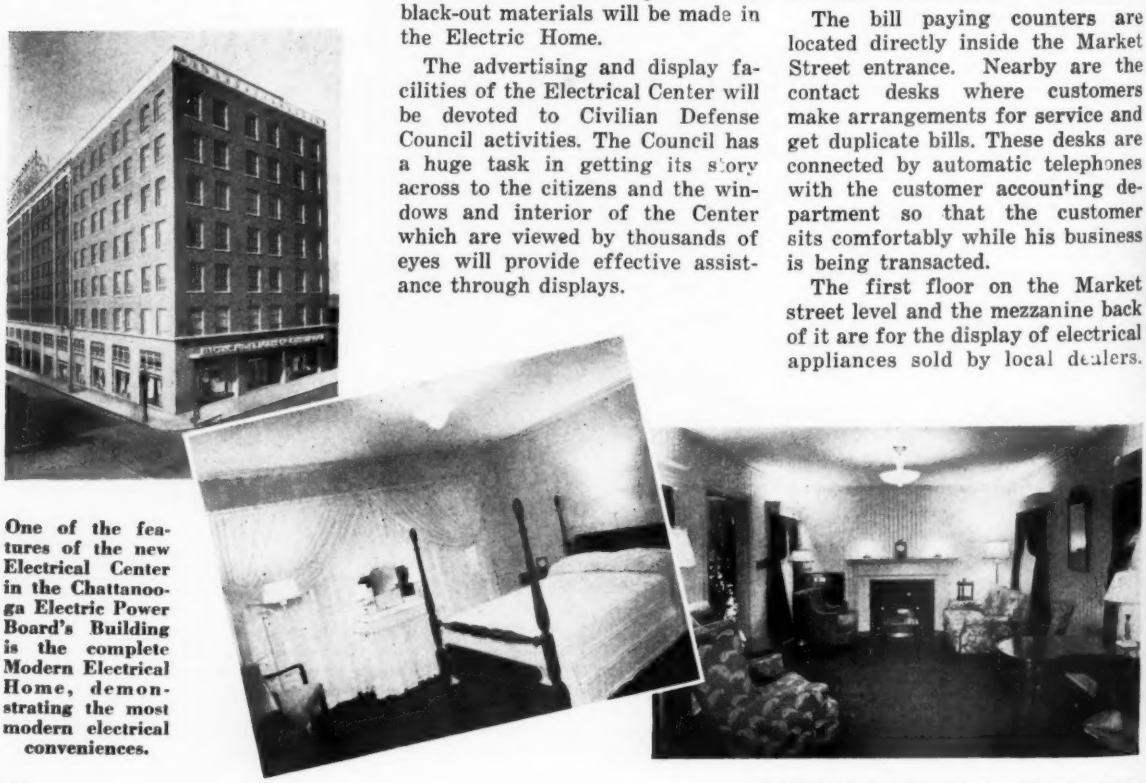
Office space in the Center has been offered to the Council as a central location for quick contact with thousands of customers of the Board who visit the Center to pay electric bills.

Last, but not least, the Board has offered to mail Civilian Defense Council literature with customer electric bills. In this manner a message can be carried into every home in the community.

Returning to the peace-time purposes for which the Electrical Center was planned, a visitor to the Center is impressed with the customer-convenience that has guided the Power Board in its design of the center. The sole object was to make it easy for customers to pay bills and transact other business in connection with the use of electricity in their homes. It was also the desire of the Board to provide a merchandise mart that would be effective in helping dealers sell electrical merchandise.

The bill paying counters are located directly inside the Market Street entrance. Nearby are the contact desks where customers make arrangements for service and get duplicate bills. These desks are connected by automatic telephones with the customer accounting department so that the customer sits comfortably while his business is being transacted.

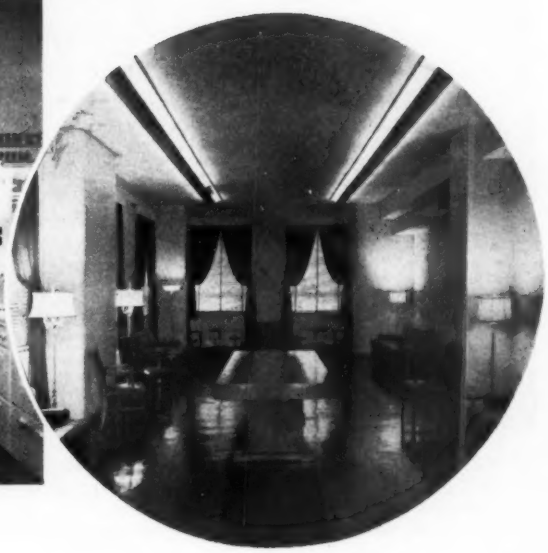
The first floor on the Market street level and the mezzanine back of it are for the display of electrical appliances sold by local dealers.



One of the features of the new Electrical Center in the Chattanooga Electric Power Board's Building is the complete Modern Electrical Home, demonstrating the most modern electrical conveniences.

Forty-five thousand visitors passed through the doors of the Chattanooga Electric Power Board's "Electrical Center" during its opening week. An outstanding installation of its kind, it holds great promise for the electrical industry in that area when present emergency conditions are passed. For the time being, these splendid facilities are being utilized for civilian defense activities. Classes in nutrition, safety and first aid, as well as appliance conservation are being conducted under supervision of Power Board employees. Meeting rooms are made available to other defense groups.

Upper right, second level of the Center's Merchandise Mart. Directly above, kitchen of the "Home Service Center," including practically every standard electrical kitchen appliance. Right, the auditorium of the Home Service Center which seats 175 people and is completely equipped with both 16 and 35 millimeter sound projection equipment. Below, the Light Conditioning Center in the Merchandise Mart. Lower right, one of several meeting rooms.



The entire first floor of the Chattanooga Electric Power Board building is surrounded by display windows. Subject matter featured in the windows covers a wide range of topics, some examples of which are shown here: educational, sales promotion, and public relations.

The entire third floor of the building is a home service center of practical assistance to the housewife in learning about modern electric appliances and how to adapt them to improve her own home. There is an auditorium for group meetings. The stage is equipped with all the necessities for the use of any electric appliance; water is provided to demonstrate laundry equipment and the all-electric sink; outlets are available for ranges and refrigerators.

Moving pictures are shown in this room to present new developments in the electrical industry and to show how electricity makes home work easier and the homemakers' hours of leisure longer. Two parlors are provided for smaller group meetings, and special showings of new merchandise by the electric appliance dealers of the city.

This complete all-electric kitchen demonstrates every modern appliance scientifically placed—electric refrigerator for the preservation of food and cold cookery; electric ranges for the easy preparation of healthy, appetizing meals; electric dishwasher to wash and dry the dishes in the most sanitary way, and an electric disposal unit to replace the old garbage can and get rid of wastes in an easy way.

One of the most attractive features of the new building is the electric home exhibit on the first floor, designed to show the conveniences and comforts electricity can bring to the average family.

The electric home was one of the most popular features during opening week, and every day since from 50 to 150 visitors have seen this exhibit. Much information as to the lights and decorations has been given to people building or rebuilding homes.

Fluorescent and indirect lighting are combined in the electric home to create new effects of practical and decorative value.

In the light-conditioned living room, by moving silent mercury switches, seven different lighting effects may be created. The floor lamp plan is balanced to give adequate food-candle readings at each chair. These lamps are connected into a plug-in strip in the baseboard and are controlled by wall switches. The center fixture is semi-indirect. Fluorescent cornice lighting enriches the color scheme of this room.

For Victory Keep 'em Flying For Security Keep 'em Buying

By Douglas C. Goff*

FIRST THINGS come first, and winning the war is our primary objective. We must have a vast increase in the size and fighting efficiency of our air force to make certain that gangster governments shall be blasted from the face of the earth, never again to rise to a place of power.

"Keep 'Em Flying" is more than a slogan—it is the rallying cry of a people aroused as never before.

To win this war we must have machines, the men to build and operate them, and—money. Which of these is most important? A wise man might reply "Which is the most important leg of a three-legged stool?"

So long as America is to remain The Land of the Free we will have to *pay* for our machines of war. We will have to pay for the materials, and wages to the men who make the materials. We will have to pay for manufacturing the machines—wages, transportation, and development costs. There will be supplies to buy and to manufacture—fuel and ammunition, more wages and transportation.

Millions of soldiers and sailors and marines—officers and men—a goodly percentage with families to support back home—all must be paid, and furnished with clothing, equipment, food and medical supplies.

All this takes money—a billion dollars a week, the latest official estimate says will be required—and that is over $142,000,000 a day! Such money circulates—fast! Raw materials, wages, transportation, finished goods, salaries, light, heat and development costs—over and over it turns, being spent and re-spent, and leaving a certain part at every pause in the form of margin, or "profit" as we like to call it.

To replenish the wear and tear on each dollar as it turns over at such high speed we must, first of all, buy bonds, and then, to raise the balance and prevent inflation coming so fast as to tear our economic system to pieces, we have a further "governor" in the form of taxes.

Taxes will be heavy on some, not so heavy on most people, and will take "dang nigh all of it" in the case of the really big fellows.

So there will be a lot of money in circulation to be spent for food and shelter, bonds and taxes, and living necessities of all sorts. Somebody must make these non-military necessities, and this means more materials, more wages, more transportation, and we're off again with these dollars turning over as they pass from hand to hand.

Fortunately ours is a country able to provide an all-out war effort and still have men, materials and manufacturing capacity for every day requirements of the people at home. How much of this surplus capacity will be left to meet non-military needs remains to be seen—but that it will be very substantial seems beyond doubt. The products of these plants will be in demand to the extent of which they are advertised and sold intelligently.

Farm Market is Expanding

Farmers always have worked hard, but now they will get higher prices for their crops, and a sudden increase may be expected next summer and fall in the number of farm families ready to buy things they could not afford before, and so the market will further expand.

All this means that those of us not needed by our country for military service, or for work in war industries, can do our part for national security by *Keeping 'Em Buying* good products, sensible products—time-saving and money-saving products. This is a patriotic obligation and a necessary program to round out our total war effort.

If food spoils in an old ice box, it is not only economical and sensible for that family to have a good electric refrigerator, but a vital contribution to the health of that household.

Think of the many homes now cooking with kerosene or coal—fuels needed for the war program—where time and money, and food, could be saved by cooking electrically.

Is it wise economy for the mother of the family to bend over a tub of clothes in the back yard and rub the life out of herself, and the clothes, when an electric washer would do the work in less time and with a fraction of the wear and tear on the clothes?

And what about sweeping and housecleaning? The hours of work, and labor saved, by using a modern vacuum cleaner, releases time and energy for other household duties and makes for a healthier, happier home.

When cooks and maids leave their jobs and go to work in some factory or mill, as thousands of them will do now, there will be a new appreciation of the economy and the time saving of an electric dishwasher and a garbage disposal unit, to say nothing of the fact that the dishes will then be hygienically clean, and waste food will be disposed of before it putrefies and becomes a menace to health.

Whether you are selling electric appliances, bicycles, furniture or baby buggies—none of which will, of themselves, wipe out a Jap or a Hun—you are doing your bit toward softening the economic shock of war provided you are making sure that each sale supplies a definite need, and that the right size and type of merchandise has been recommended to supply that need.

Should it ever become necessary for our national safety to discontinue our sales activity, we will be told about it, and all of us will promptly comply with whatever regulations are found to be needed. But until that seemingly unlikely happening occurs, let us realize that it is our patriotic privilege as good salesmen, and as specialists in our jobs, to advise our customers as to what they need and to *Keep 'Em Buying*—not just an electric refrigerator, but a way to preserve food so as to retain its full nutritional value—not an electric range, but a way to cook so as to cut the grocery bill and yet add more vitamins and mineral salts to the family diet—not a dishwasher, but a way to keep our eating utensils hygienically clean. Think, and sell, in terms of the true service rendered by whatever you offer, and be sure they represent the best available

(*Continued on page 48*)

*Mr. Goff is director of sales training for L. W. Driscoll, Inc., of Charlotte, N. C.

Appliance Dealers Will Survive

Dealers are hard hit by restrictions but are showing ingenuity in the lowering of overhead expense and the development of service sales.

ONE APPLIANCE dealer who isn't worried about getting sufficient service business to make up for the lack of sales of new appliances is Wallace Johnston, head of Wallace Johnston Company, in Memphis, Tennessee. Foreseeing today's limited-production situation, Mr. Johnston began a year ago to enlarge his service facilities, and now is making these "work for him" as a direct means of getting service business which he expects to become four or five times what it is today.

Johnston's idea for realizing the maximum amount of service business in the future is simply letting his customers know exactly how the firm is set up for service; making sure that they realize this by taking them on "plant tours" through each part of the building which the average prospect would never see.

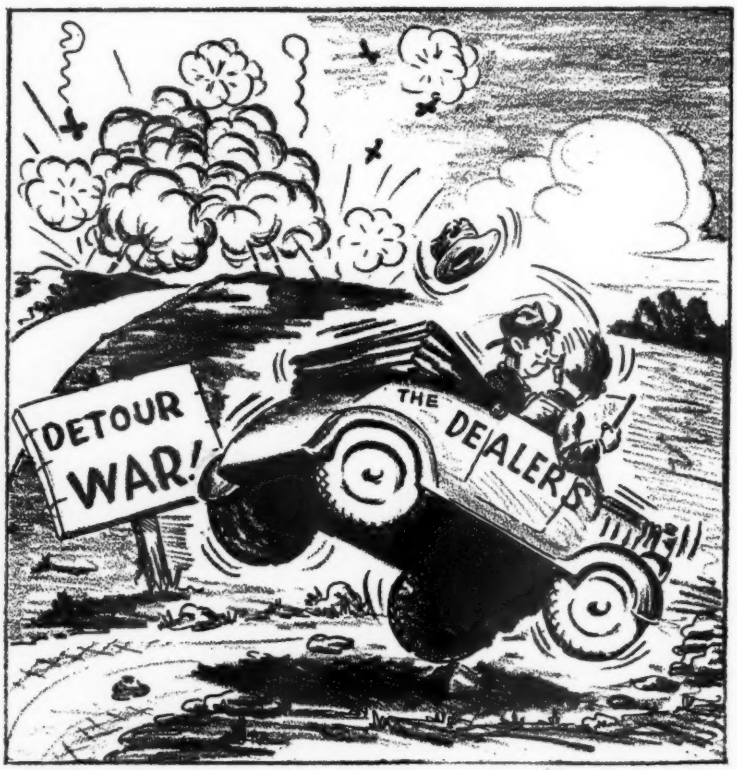
"We had spent a lot of money on building up a service department, not only to keep up warranty service on the appliances we sell, but to handle business from anybody else as well," Mr. Johnston stated. "And we have made it just as much a part of each salesman's job to 'sell the service shop' as to sell new appliances."

Actually, Mr. Johnston has been enlarging and modernizing his service equipment for more than five years, but it has only been during the past year that he adopted the idea of taking every customer of the store on an extended tour through the service department.

Since January, 1941, it has been routine policy for each of the nine salesmen of the firm to spend an extra half hour or more with every appliance customer (whether they are sold or not) on showing them the complete layout of the service department. Most people, it has been found, have been willing to go through this process; and, in fact, many of them consider it an honor. The "tour" starts with the parts department—where a $7,000 stock of parts for all refrigerators, ranges, washing machines, stokers, etc., handled by the store is on hand. Men and women alike are taken behind the parts counter into the room itself, where the orderly layout of parts on steel office shelving is demonstrated. They are also shown a 5 by 6 foot sign over the parts counter which reads "We are now stocking 2,065 items totaling 14,666 pieces for repairing your refrigerator, range, and washing machine." Figures on this sign are changed from month to month as new parts are added to the inventory, and customers reading this get a lasting impression of the huge number of replacement parts in stock.

From there, the customer goes to the service shop, a large room where every mechanic wears a coverall uniform, the cement floor is scrubbed clean daily, and metal work benches under fluorescent lights are used for turning out service work. Cleanliness as well as efficiency is emphasized — a point which always scores heavily with women. While in the shop, the customer is shown the spray booth in the center, completely enclosed in a metal housing, and equipped with ventilating fans, electric baking oven, etc. Customers are invited to ask questions about their own appliances, and reminded that the shop wants their service business as well as appliance purchases.

The next two steps include a visit to a 90 by 20 foot warehouse in the rear where a vast stock of



Courtesy of Dallas Power & Light Co.'s "Electrical Merchandiser"

Just hold tight—there will be a better road at the other end!

used refrigerators, washing machines, ranges, etc., is piled up awaiting reconditioning in the shop—most of these purchased from dealers without shops, or from people leaving Memphis.

Displayed thus, the trade-ins demonstrate that Wallace Johnston will always have good appliances to sell, and reminds visiting women to tell their friends about it. The tour then goes to a trade-in refrigerator showroom behind the main showroom where 25 reconditioned, repainted, and fully guaranteed refrigerators are always kept on view. From here, the customer is taken to the office, and shown a 4-line trunk telephone system, file of service records, and other facilities which assure the prospect that Wallace Johnston can put any appliance back into first class shape in jig time.

To date, the number escorted through the service plant in this way amounts to around 110 a week, the figure naturally fluctuating with the season. The high percentage of four out of every five are willing to go through, and always express pleasure in doing so. Wallace Johnston is frank in explaining to them that the store wants its customers to know exactly what facilities it has, and that because it cannot sell appliances in the same volume as in the past, it wants to make up for it with service work.

The sign hanging near the parts department which directed customers' attention to the large number of different items available.

"It is surprising how many people tell us that we've won their confidence," Mr. Johnston pointed out, "and most of them immediately promise that when anything does go wrong with appliances in their home, we will be called at once. I think we have accomplished more good with this one idea than any amount of newspaper advertising or other promotion would produce — and though we of course do not know what's going to happen in the future, we think we have a stronger grip on the service market."

Refrigerator Reconditioning Increases Trade-in Sales

SOLICITOUS attention to used refrigerator trade has resulted in increased new model sales for two Frigidaire dealers — W. (Pat) Crow's in Fort Worth, Texas, and the Brown Dunkin Department Store in Tulsa, Oklahoma.

Both stores found, for instance, that their complete reconditioning plan enabled them to give greater allowances for trade-in on new models, resulting, of course, in a boost of new sales. In addition, their reconditioned sales bring more prospects into the store, attracting low income groups who might think at the time that they can't afford to buy a new refrigerator.

Both stores do a complete although economical reconditioning job on all used refrigerators. Both give trade-ins "appearance appeal" by refinishing the cabinet, replating the shelves and buffing the hardware. Special attention to mechanical parts has resulted in a minimum of service calls from buyers.

Crow's reports replacement sales running nearly 50 per cent ahead this year. Brown Dunkin has shown a 50 per cent increase in both used and new sales for the last four years. Manager W. E. Carlton, of Brown Dunkin, gives special training to used refrigerator salesmen and he estimates that this year will see the re-sale of between 200 and 300 used refrigerators.

A special show room for reconditioned refrigerators has facilitated their movement. This attractive showroom is located in the dealership of Pat Crow, of Fort Worth, Texas.

Telephone Selling Replaces Sales Crew

When the army drafted three of the six man sales crew of the Vaughan Company, appliance dealer of Hot Springs, Ark., and the rest quit to go to work on defense projects, the store didn't "give up the ghost." Instead, it has replaced the entire six men with one specially-trained appliance salesgirl who can actually contact more prospects in three hours over the telephone than the former crew of specialty men.

The Vaughan Company went to the telephone company to find a young woman with a pleasant, intimate voice which would register well with Hot Springs housewives. After testing several, one was chosen, and brought into the store

(Continued on page 48)

Program of Salvage Operations For the Utility Engineer

By S. J. Spurgeon*

NEVER IN the recorded history of man has there ever been a conflict affecting so much of the world's population! Never has the victor of any conflict promised to enslave so many people on the one hand and to liberate so many on the other! Never has the production of war machines played a greater part in the ultimate outcome of a conflict! So great are the issues at stake that we can ill afford to stand back and assume the attitude of "let John do it." Every individual, whether man, woman or child, must shoulder his or her share of the burden, however painful it may be, and stride confidently toward a complete victory. It is unnecessary to ask if we, as individuals and as a group, will carry our share of the burden—we will and gladly!

We are facing dangerous, difficult and anxious days in this world-crisis. We must steel our every fibre to meet each and every task in a confident self-reliant manner. There is a hard task to perform by every liberty-loving person on the face of this earth. We utility men already have been assigned our tasks and we can and will do them with zeal and without complaint. Let us not forget that we have the responsibility and privilege of being the national wheel hub of the huge industrial machine. We must keep that hub well greased and adequately maintained to insure its continuous operation under the great weight of our war machine.

Some of our number are being called to the colors, others are being lost to war production industry and construction, while at the same time our facilities are being rapidly expanded to care for the ever increasing power requirements required to produce our vital engines of war. We have yet to feel the full weight of the burden we are yet to bear! We have yet to fully utilize that vital faculty of Americans called "Yankee ingenuity"!

Now is the time to clear the decks of our many utility organizations and condition them for receiving the full weight of the task at hand. It means nothing less than the streamlining of our organizations so that every man has an assigned station and is charged with the responsibility of performing all his duties with dispatch and accuracy. Full confidence of the superiors must be extended to the men down the line so that every man will feel the entire weight of his full share of the burden.

Maintaining Organization Efficiency

"Personnel short circuits" must be entirely eliminated since these are just as detrimental to the proper functioning of an organization as are the electrical short circuits to the proper functioning of our great electrical systems. Personalities and internal politics must be brushed aside in order to extract the latent strength of the entire personnel. Individual initiative must be encouraged to function so that the full capabilities of each employee will be developed. Unless these few simple rules are followed, our available man power will break down under the already burdensome load.

A corporation, or similar organization, is looked upon, in the legal sense, as an individual. After some thought in this direction, we find that a corporation is an individual in a personal sense, for it has morality, loyalty, responsibility, resourcefulness, aggressiveness, skill, and other human attributes, all conferred upon it by the composite characteristics of the individuals of which it is comprised. It is well to compare the characteristics and operation of an organization's anatomy with the characteristics and functioning of man's anatomy in its most healthful and alert state.

Like man's anatomy, an organization is made up of component parts, the employees, which function in response to a brain or central control, the management. Just as the full capabilities of a human being are obtained only when the brain and body are strong, alert and synchronized, so are the full capabilities of an industrial organization obtained only when there is strength in both the management and the subordinates and when full coordination and confidence exists in the entire organization. It is immediately apparent that to develop the desirable characteristics in an organization, it is first necessary to accomplish the same in each individual member of any particular organization. When this is accomplished in our utility organizations, they will operate with the efficiency, precision and fidelity of man's anatomy, as they must in this grave crisis, and they will find no problem too difficult to attack and solve.

Perhaps I have overemphasized the personnel problem and its relation to the composition of an efficient organization. Yet, if we are to acomplish our Herculean tasks, handicapped by insufficient man power, we must first make available the necessary machinery to assure unfailing achievement. A comprehensive conservation program will require the allocation of a sector of our man power to it without seriously affecting the efficient operation of the many other functions of the organization. It is apparent, throughout the conflict, that the vitality and efficiency of our organizations must be maintained at their highest attainable level.

The material problem is a crit-

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The page at the right reprinted from "Snap Shots," employee publication of Georgia Power Company, shows what that company is doing to promote salvage and conservation of materials. Their operations along this line are typical of many other utility companies.

*Mr. Spurgeon is supervisor of substations for Alabama Power Company, Birmingham, Ala. This article is adapted from a paper presented before the Engineering and Operation Section, Southeastern Electric Exchange, in Raleigh, N. C., March 12 and 13, 1942.

They Waste *NOT!*

The photographs on this page are reproduced to show a few of the many things that employes are doing to conserve materials vital to the country's gigantic armament program. Miss Georgia Harris, of the Atlanta cashier's department, above, is selecting the smallest usable envelope for the day's mail. Note "saved" rubber bands, envelopes and paper clips. (Story on Page 1)

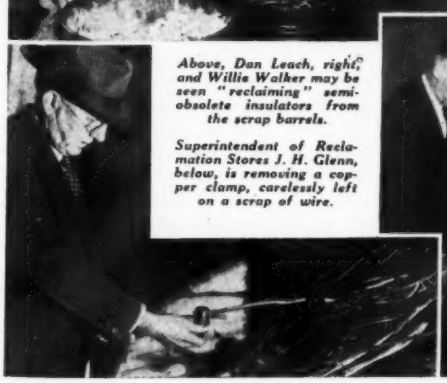
Conserving packing materials is no new stunt for the stores department. Cardboard cartons, for instance, are used and re-used. Above, C. W. Moreland, stock clerk, and B. E. Phillips, assistant division storekeeper, are checking the "used carton" supply in Atlanta.

With copper at the top of the critical list, the job which H. A. Haigler, Jr., reclamation stock clerk, is shown doing becomes a necessity. Above he is splicing pieces of scrap copper wire for re-use on the system. The machine connects the ends by crimping them in a sleeve.

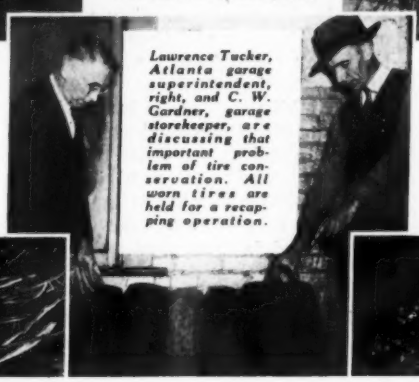
To conserve envelopes, Mrs. Lillian S. Martin, left, and Mrs. Margie Gillespy, of the Atlanta mail room, consolidate mail for outside points.

Above, Dan Leach, right, and Willie Walker may be seen "reclaiming" semi-obsolete insulators from the scrap barrels.

Superintendent of Reclamation Stores J. H. Glenn, below, is removing a copper clamp, carelessly left on a scrap of wire.



Lawrence Tucker, Atlanta garage superintendent, right, and C. W. Gardner, garage storekeeper, are discussing that important problem of tire conservation. All worn tires are held for a recapping operation.



Shown pulling a roll of wire from the scrap pile for reclamation is J. R. Patrich, Atlanta division storekeeper, above.

General Storekeeper R. L. Leach, below, is examining a lot of brass bases removed from burned-out street light bulbs.

ical one and I fear we have been thinking too much in terms of conserving only "critical" materials. It would be more to the point to think in terms of conserving all materials, since in times of war all materials are critical. The use of the so-called noncritical materials often involves the use of those termed critical. Certainly, all materials require men and machines to produce and both are on the critical list. It is the duty of our industry as a whole to use the absolute minimum of new materials, especially the critical materials, and to construct only the facilities critically needed.

There are many easily stated ways of conserving materials, but to produce the results expected of us will require ingenuity and determination. Complete success of a conservation program cannot be obtained if a single man reserves for himself the privilege of using materials in excess of the minimum amount required and without regard to their critical status. The unrestrained use of materials by even a small number of individuals is the inception of a general breakdown of the program. In order that we may have a simple yard stick with which to lay out our program and with which to measure our accomplishments, I will submit to you the following condensed program:

(1) Acquaint all personnel with the full details of the conservation program.

(2) Carefully plan plant improvements to save materials.

(3) Construct only those facilities critically required.

(4) Limit the magnitude of new facilities to requirements resulting from the existing emergency.

(5) Examine current designs and specifications of plant facilities and make new designs to utilize materials and equipment on hand and to reduce quantities of new and critical materials required to construct new projects.

(6) Critically examine active system plant facilities to locate idle and underloaded equipment and appurtenances.

(7) Search store rooms, building basements, shops, crew headquarters, substations, rights of way and other premises for slow moving, inactive, obsolete and scrap materials.

(8) Recondition, rebuild and reclaim all idle materials and equipment useable in new construction.

(9) Make a survey of all available spare maintenance parts, and supply maintenance men with periodically revised lists of same, identified as to equipment, part number and location on system.

(10) Return to the shop, for reclamation and salvage, all used parts and other materials (regardless of condition) obtained from maintenance operations.

(11) Advertise for sale all excess usable materials or equipment. Your neighbor may need them.

(12) Promptly sell all scrap materials.

The successful execution of this simply stated conservation program will be next to impossible unless the responsibility of directing it is vested in one capable individual who is provided with the necessary authority and managerial support. The individual selected to carry on this important task must work with and through the existing organization, but must retain the authority to direct and enforce assignments. The appointment of the director of conservation should be made only after the careful consideration of his capabilities and aptness. Emphasis should be placed on his ingenuity in meeting situations; his ability to instigate and carry projected work to conclusion; his aggressiveness; and his knowledge of materials, equipment, maintenance practices, and the system plant.

It is essential that every member of the organization acquaint himself or herself with the full details of the conservation program. Only with this knowledge will employees be able to fully cooperate. Employees should be encouraged to make suggestions for effecting conservation and thereby assure widespread help and cooperation.

Careful System Planning Needed

Each system addition must be carefully planned with the material question uppermost in mind, since such planning not only conserves materials and equipment, but usually reduces maintenance and operating expenses. Too often, in our haste to initiate and construct additions, wasteful and ill-conceived plant additions are made. The press of these critical times must not be allowed to aggrevate this tendency. When plant additions are planned it must be remembered that we are now required to serve two distinct classes of loads—one contributing directly to our war effort, and the other related to but not directly involved in war production.

The first should be planned to provide adequate service with as high a degree of service availability as possible while the second can usually be regarded as of secondary importance in the matter of service availability thus eliminating much apparatus normally installed to insure continuity of service. Even in planning the facilities to serve war emergency loads, critical materials can be saved without seriously jeopardizing service.

All system plant additions must be limited to those required to meet critical conditions caused either by added war emergency loads, or by existing system inadequacies. Each project must be given the acid test of critical examination to determine its necessity. The accurate appraisal of the project will require exceptional judgment and complete knowledge of the entire electric plant and the load to be served. There will arise differences of opinion resulting from such examinations and where such differences arise the conservation director's recommendations should be followed. Remember, he has a program, has given it detailed study, and is responsible for its success. He will certainly make mistakes, but granting he is a capable individual, he will make fewer mistakes than will be made if he is unsupported, or if the various divisions of the organization are allowed to function independently.

New facilities required to serve essential emergency loads must not be of greater magnitude than necessary to serve the loads that can reasonably be expected to develop during the period of the emergency. Any tendency to use the emergency as an excuse to obtain desirable improvements must not be tolerated.

For many years we have ceaselessly worked to improve and perfect designs of plant facilities of every nature. It is a tragic experience to sacrifice even the least of these designs on the altar of war. It is, however, a part of our task to make this sacrifice now and not tomorrow.

A careful study of designs of large and complicated projects of a permanent nature, such as large generating plants and certain substations, will yield comparatively little to the conservation program because of past efforts toward simplification of design. However, such a study will doubtlessly result in conservation of sufficient material to well justify the effort.

A detailed study of transmission and distribution designs will yield rich rewards to the conser-

vation effort if capably executed. It is likely that many facilities constructed now will be idle or under loaded after the war. It may also be expected that there will be a period of retrenchment and consolidation. Every utility will have large quantities of salvaged materials and equipment for which there will be little immediate use and these materials must be utilized in construction in the years that follow. If we conserve now on materials and heavy equipment, forego desirable but not vitally necessary appointments, and utilize the shorter lived substitutes in place of the critical materials, we will not only effect a saving in first cost, but we will also lighten our burden of idle equipment and materials sure to exist after the end of the war. The larger the stock of such equipment and materials, the longer the period, following the war, we will be required to refrain from purchasing those new and improved products born of the war. To those who conserve now will go the early privilege, after the war, of system reconstruction on a modern basis.

Design Simplification Essential

Simplification of designs must be a watchword. Where possible, substitutes must be found and used instead of utilizing critical materials. There are many of these substitutes that have some superior characteristics to those of critical materials now in common use. The lowly wood pole and other wood shapes can be made to work in many places. Their proper use in substation structures, high voltage tower lines and in medium and low voltage distribution lines provides better insulation than does steel. In addition to saving steel, wood structures also save large quantities of concrete.

Tempered masonite and other like materials can be used over wood or light steel frames for constructing distribution feeder cabinets, relay cabinets, meter cabinets, terminal boxes and many other similar items in place of steel sheet. Such materials are resistant to fire and they weather well, especially when painted.

Transite conduits and other similar products can be used to replace steel conduit. Large sizes of transite water pipe can be split and used as cable trenches, the prepared collar forming a joint and also providing a means of fastening the two pieces together. The cable trench as described can be used to replace multiple runs of conduit between control centers and equipment. Transite is superior to steel pipe in that it will not rust out. Some types of rubber sheathed cables can be installed directly in earth or in conduits, thereby eliminating lead sheathed cables. These few examples of substitute materials serve to emphasize the wide choice of materials from which we may select substitutes.

We must start immediately to investigate substitute materials and, where possible, design them into plant extensions. To wait until definite plant expansions develop will defeat the conservation program. To wait makes the old adage "haste makes waste" come true. We waste our war effort! We must remember that when a load develops, we must proceed immediately regardless of cost. It is then too late to investigate and plan for the use of substitutes.

Every system has a certain amount of installed plant that is either underloaded or idle, usually resulting from the shifting of load or from past system rearrangements. Regardless of how small are the quantities of materials and equipment expected to be obtained from such sources, an immediate system survey should be made and all materials and equipment found should be made available for system additions. This method of securing materials may be costly in some cases, but cost is of secondary importance in the present crisis.

A regular treasure chest of slow moving, inactive, obsolete, and scrap materials sometimes will be uncovered by a thorough search of store rooms, basements, shops, crew headquarters, substations, rights of way and other premises. To the extent possible, equipment and materials obtained from these sources should be reconditioned or reconstructed and reused. Items of equipment and materials, thus obtained, that cannot be reclaimed, should be relegated to the scrap heap.

Most utility systems have been plagued with quantities of obsolete and idle items of equipment collected over the years. Such items may now serve as a blessing if they are critically examined and reconditioned as applications for reuse are found. Old indoor equipment, such as oil circuit breakers, disconnect switches, instrument transformers, etc., if not needed for indoor installations, can be used in outdoor installations by mounting them in cabinets. Transformers of incorrect voltage can be reconnected or rebuilt for a required voltage. Obsolete meters can be reconditioned and pressed into service. Indoor feeder voltage regulators can be converted for outdoor use. The extent of such reconditioning or rebuilding is limited only by the ingenuity of the conservation director and the quantities of such equipment available.

System Maintenance Program

The maintenance personnel must be kept advised of all the spare parts located on the entire system in order to expedite the restoration of equipment to normal service and to avoid the necessity of purchasing new spare parts until absolute need makes purchase necessary. This will probably be one of the most complex and difficult phases of the entire program, due to the reluctance of the maintenance men to release parts for use in other parts of the system for fear of delays in repairing equipment in their own district. Good judgment must be exercised in handling this portion or phase of the program.

Greater attention must be given to the reclaiming of parts and materials removed from equipment during maintenance operations. The use of welding, brazing and metal spraying apparatus will be found of inestimable value in the reclamation of equipment parts. It is essential that the maintenance foreman completely identify each part to aid in restocking after the reclaiming process is completed. Regardless of the condition of the defective parts, they should all be sent to the designated repair shop. Insulating oils should be carefully preserved and reconditioned. Properly reconditioned oils are just as good and serviceable as new oils.

Every utility has varying quantities of materials and equipment for which it will have no use within a reasonable time. These should be immediately offered for sale so that they may be utilized by others who are handicapped by their inability to purchase similar new equipment. A reasonable price should be placed on such materials so they will move quickly.

Some utilities will be unable to carry on an extensive conservation program in their own shops

because of inadequate facilities. Where adequate shop facilities are not available, it will be next to impossible to develop them now because of the war demands upon materials and equipment of all kinds. In such cases local machine or repair shops can usually be relied upon to gear their plants to your needs.

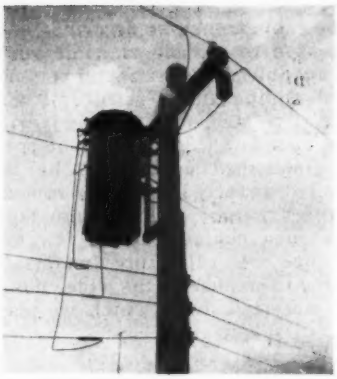
There should be no disposition or necessity on the part of any operating man to seriously curtail maintenance for lack of men and materials. Instead, greater efforts should be made to improve and intensify maintenance operations because the increased loads imposed upon our utility plants certainly will have telling effect on their reliability. Maintenance personnel must be urged to greater efficiency and more effective conservation of materials in order to insure an uninterrupted power supply to our vital war enterprises.

The conservation of materials is certainly the patriotic duty of every utility and utility employee. Let each of us as individuals resolutely apply ourselves to the task so that it may be said of us, when the conflict is ended, "Your task was well done, you could not have done more."

Distribution Transformers Now Sealed for Life

Some distribution transformers are now being built hermetically sealed with covers welded on. This last courageous step not only indicates that trouble now rarely occurs to the "innards" of a transformer, but also it, in itself, removes the last rmeaining cause for periodic attention.

By sealing the transformer, air and moisture can no longer reach the oil, thus eliminating sludging, acid formation, and lowered dielectric strength. All breathing is now prevented, there being no gasketed joints — even around the bushings. These, incidentally, were the last obstacles to the complete sealing of the transformer. By making use of the technique by which porcelain-to-metal connections are made, this problem was solved. Although it is not anticipated that the case of these transformers will require opening, provision is made for cutting off the top with a torch, and subsequent rewelding. The small amount of air trapped inside during original manufacture or a single opening in service does not contain enough oxygen to cause oil deterioration.

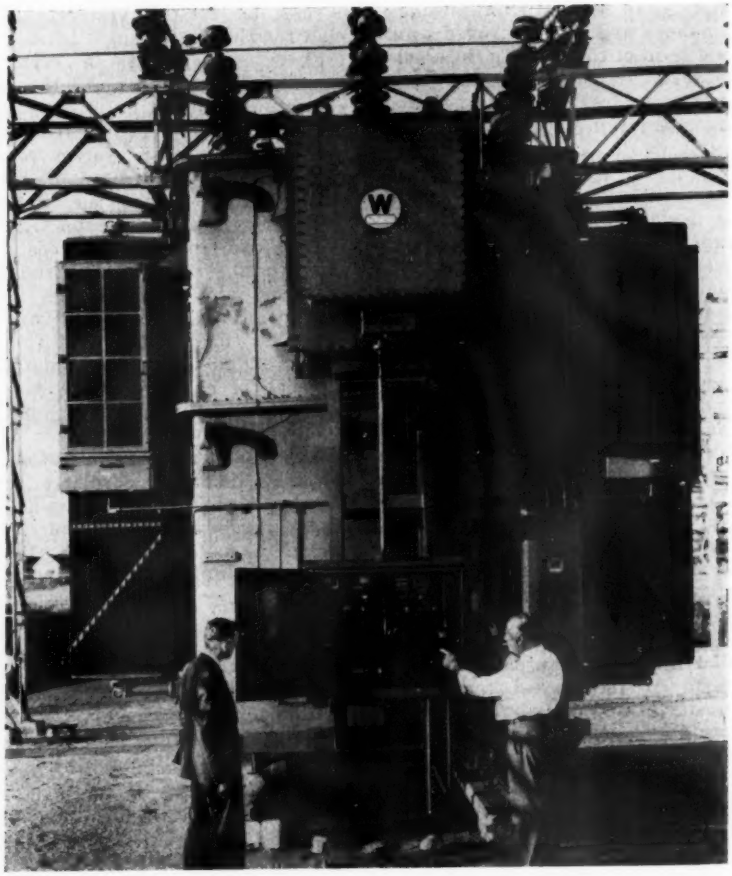


This distribution transformer, with cover welded on, is sealed hermetically for life.

Single-Pole Tripping and Reclosing Effectively Used

In the putting of single-pole tripping and reclosing to work, the relaying problem is simple to state. Means must be found for determining, without risk of mistake, which phase of a polyphase line is in trouble so the proper pole of the breakers can be opened and reclosed while the other poles remain closed to hold the interconnected systems together. Conventional ground relays are unable to distinguish which phase is faulted.

The answer has been found in the same mathematical concept that has given birth to so many ingenious devices — symmetrical components. Negative and zero sequence currents for each phase



This 4300-kva, 115-kv voltage regulator recently installed by the Georgia Power Company uses a tap-changer mechanism that gives the normal range of regulation with but half the number of transformer taps. In addition, the kva required in the regulating windings is half that of the older types. A reversing switch, by which the regulating winding is connected first to boost and then to buck the voltage, makes it possible to increase the rating without increasing the size of the selector or the transfer switch.

are delivered through suitable filters to the new-type relay. When one conductor is grounded, the vectors representing the negative and zero sequence currents for that phase have a phase difference less than 90 degrees; for the other two phases, the phase difference is greater than 90 degrees. By this discrimination the faulted phase is identified.

First use of this scheme is on the 50-mile, 132-kv, single-circuit line of the Public Service Company of Indiana. This line carries up to 75,000 kva in either direction. In March, 1941, the line was thoroughly tested with deliberate faults. Although the line carried 50,000 kva at the time, the relays made correct selections; line to ground faults were cleared by the breakers in considerably less than the 35 cycles allowed, there was no visible flicker in the lights. The oscillographs showed very little current disturbances in the various parts of the system outside the line, and the machines at the two ends of the line maintained synchronism.

With this proof of the success of the single-pole tripping reclosing scheme, there is already indication that it will be widely used as a means for increasing the stability limits of main interconnecting lines and for providing continuity of service to loads fed over a single circuit. In short — and right now this is important—it is a device to enable single-circuit lines to carry greater load without risk of interruption.

Utility Intercommunication Aided by New Radio Device

A completely self-contained radio telephone combination transmitter and receiver weighing only four pounds, and not much larger than the handset of a "French" telephone, has been developed. The unit is being made available to governmental agencies and services, including municipal divisions, public utilities, fire and police departments, railroads and other transportation agencies, etc., as well as individuals, subject of course, to licensing by the Federal Communications Commission where required, as well as priority rating.

Believed to be the most compact and light-weight complete transmitting and receiving outfit ever produced, the built-in battery power supply for the new Weltronic "Trans-Ceiver" under continuous operation has a rating of about 8 hours. This is equivalent to approximately a week to a month's operation under 'normal' intermittent service. The power supply is derived from standard commercial batteries in order to keep battery replacement cost at a minimum and facilitate maintenance of operation.

With a range of upwards of a mile over land, the units are provided with off and on switches and finger operated selector to change from transmitting to receiving and vice versa, while talking through the unit.

Although the "Tran-Ceivers" are designed for operation on a single wave length, thus requiring no tuning in service, their frequency range is adjustable from 112 to 300 megacycles through a simple externally accessible adjustment.

Also provided on the units are a volume control and a detachable adjustable short fish-pole type of aerial. Construction is as rugged as that of a commercial telephone unit.

In operation, when the toggle switch is thrown into the 'on' position, the unit is 'receiving.' To talk through the unit, it is necessary merely to pull the selector finger lever down against light spring pressure. Releasing the selector lever switches the unit back to 'receiving' again. The "Trans-Ceivers" may thus be used in pairs or groups with or without a central receiving and control station.

A completely self-contained radio telephone combination transmitter and receiver that weighs only four pounds and which prove useful in the electric utility field for contact with trouble crews, etc.

New Meter Protector Prevents Coil Damage

To reduce lightning damage to watthour meters, electric ranges, and other appliances connected to 120/240-volt exposed secondary circuits, a new meter protector has been developed.

The protector is a two-pole porous block lightning arrestor with a 175-volt line-to-ground rating and a 240-volt line-to-line rating. Gap breakdown on 60 cycle circuits is 800 volts r.m.s, and gap breakdown on impulse is 2,000 volts crest. Discharge capacity is 10,000 lightning surge amperes.

Installing the new lightning protector in condulet below the watthour meter.

Protector elements consist of a one-inch diameter porous block with a series gap of flat electrodes, separated by a mica spacer and held in firm contact by a spring plate. The two single arrester elements are mounted in a housing of Prestite, a new high grade porcelain impervious to moisture. Mounting plate is the common connection for the two poles and when installed, is grounded.

Porcelain and coverplate mount with two screws in any standard condulet. Assembly is then covered with a gasket-sealed cover for outdoor service and a non-gasket cover for indoor service.

The condulet is located above or below a meter, and each pole of the arrester is connected to the "hot" wires. The common connection point, the mounting plate, of the protector is grounded to the neutral of the circuit. This method of connection causes the lightning surges to discharge to the ground.

PRACTICAL HELPS for the TRADE

Contractor - Dealer - Motor Shop

Fittings Now Available For Q-Floor Raceways

A complete line of electrical fittings and accessories for underfloor distribution systems used with Robertson Q-Floor has been announced by General Electric Company's appliance and merchandise department, Bridgeport, Conn.

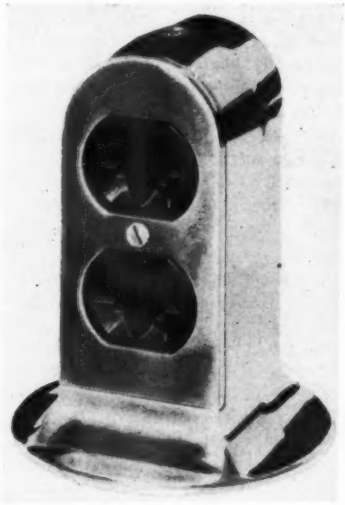
Q-Floor, which are cellular steel and recognized by the National Electrical Code, are manufactured by H. H. Robertson Co., Pittsburgh, Pa. Due to their hollow cells, Q-Floors provide raceways for electrical wires, whereby virtually the entire floor is available for electrical services, such as telephone and signal systems as well as light and power services. Since the cells of the Q-Floor are on six-inch centers, it is possible to install 8 outlets in any one square foot of floor area.

These fittings and accessories for Q-Floors, are approved by the Underwriters' Laboratories. They include distribution fittings, outlet fittings, and accessories.

The distribution fittings of Q-Floor wiring are called header-ducts. They serve as feeders to bring wires to the individual cells of the Q-Floor. They are installed at right angles to the cells. Three types are manufactured: (1) standard header-ducts for installation on top of the cells; (2) slot header-ducts for installation in slots in the top section of the cells; and (3) ceiling header-ducts for installation on the cells.

Standard header-duct is rectangular steel duct with junction units or hand holes spaced in any desired multiple of six inches. This duct is available in various lengths up to 4 feet, 6 inches. The junction units provide access to the individual cells for wire pulling and splicing. They cannot be used for the installation of outlets. The duct is fastened to the floor with duct couplings and self-tapping screws.

Slot header-duct consists of 6-inch connecting and junction units. They are assembled in the slot left for welding purposes in the upper part of the floor cell. These ducts usually are for installation only where the fill is too shallow to permit the use of standard header-duct.

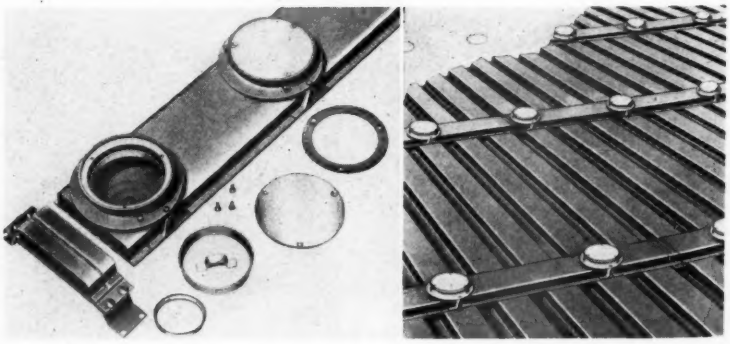


This is an outlet for use with the Q-floors. They are installed directly on the floor cells by means of "taps" which screw into the upper portion of the floor cells.

Ceiling header-duct is a surface type suitable for underside wiring to provide distribution on top of the floor as well as for ceiling outlets and other extensions on the underside. With any of these ducts the entire system is thoroughly grounded.

The outlet fittings include two standard outlets—a high tension outlet and a low tension outlet. The high tension outlet is designed to accommodate any standard twin convenience outlet. The low tension outlet is similar in construction to the high tension outlet. A bushed cover in place of the twin convenience outlet makes it suitable for low tension purposes.

These outlets are installed directly on the cells of the Q-Floor by means of fittings called "taps" which screw into the upper portion of the floor cells. The standard tap is adjustable from 2½ inches to 3½ inches. Its internal diameter is 1¼ inches. It can be set before and after fill. The assembly includes a 1-inch extension and a blanking cover. Other special floor taps and special purpose outlets are available.



Typical installation of header-duct installed on Robertson Q-floor is shown at the right. These fittings make virtual raceways of the entire Robertson Q-floor and this new method of wiring is approved by the National Electrical Code. Near top of the photo is touched up section showing how floor will appear after cement or other surface is in place. At left is header-duct parts showing junction units, hand holes, etc.

Accessories for Q-Floor wiring are available for all purposes and include: (1) accessories to connect panel to Q-Floor; (2) accessories to connect conduit to Q-Floor; (3) accessories for the finished floor; and (4) tools.

How the "Quicklag" Breaker Operates

The new Westinghouse "Quicklag" circuit breaker combines in a single unit, cooperative thermal and magnetic trip action. How different this tripping action is from former breakers employing only the thermal or magnetic methods may be clearly understood by following through its operation.

When connected in a circuit, the line is normally connected to the stationary contact (1). With contacts closed, current flows through the line terminal, or stationary contact (1), to the moving contact arm (2), through the tripping cradle (3), the flexible shunt (4), the bi-metal element (5), the coil of the magnetic element (6) and finally to the load terminal (7).

Normal opening or closing is done by moving the operating handle (8) to the right or left, respectively. The dead-center spring pressure arrangement between the tripping cradle (3), and the operating handle (8) give a quick-make-and-break action.

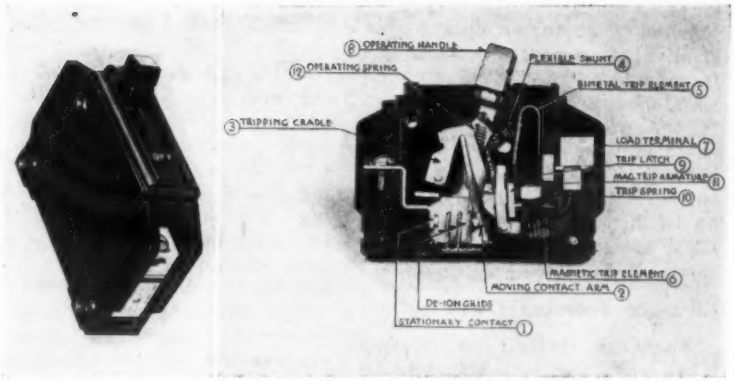
On overloads, the breaker trips by mutual operation of the bi-metallic and the magnetic elements. Automatic tripping takes place when the trip latch (9) holding the tripping cradle (3) in its normal position, is unlatched. When this happens, the cradle (3) swings upward to the right, displacing the dead center position of the operating spring (12) with consequent contact opening.

The trip latch (9) is normally in the latched position. The spring (10) tends to unlatch it by pulling on the magnetic trip armature (11). But this unlatching force is balanced by an opposite force exerted by the bi-metal element. Thus a state of sensitive equilibrium exists, which can be broken by either of, and only two methods.

(1) Heating of the bi-metal, with consequent reduction in its retaining pressure which holds the latch closed.

(2) Increase in magnetic flux, caused by a heavy current, which adds a magnetic pull to that which the spring exerts on the armature.

On light loads the magnetic element is not sufficiently strong to influence the armature to any great extent, and tripping is accomplished by action of the bi-metal only. As the overload increases, the magnetic element exerts more and more influence, assisting the bi-metal in its tripping action. Should the overload be high enough, the magnetic element will trip the latch by itself. Such cooperative action assures high speed tripping on heavy overloads, yet gives the time-delay so necessary to pass momentary overloads.



Cross section view of the "Quicklag" breaker which combines in a single unit both thermal and magnetic breaker features. The various parts are numbered and labeled to correspond with the descriptive text. At left is an assembled unit.

Mass Display of Small Appliances Helps Sales

Sales of small electric table appliances, including toasters, waffle irons, mixers, coffee makers, grilles and roasters have been advanced 30% at Krauss Company, of New Orleans, La., since buyer Arthur Lodge consolidated all together on a neat display booth in front of the store elevators, and developed a "prospect book" selling system.

Mass display of small electric items in this way is helping to overcome the loss from major appliances no longer obtainable, according to Mr. Lodge. To consolidate their appeal the store built a small booth of plywood, eight feet long by five feet wide, around which are two levels of shelves which show approximately forty small appliances. In the center of the booth is a table covered with a white cloth, dishes and silverware, and all popular table electric appliances on display as if in use.

Every item on display is priced with a prominent tag, the tag also bearing short descriptions which indicate how much current is consumed, how fast it will turn out toast, waffles, sandwiches, coffee, etc., according to the appliance, and the guarantee. Customers coming on to the floor from the elevators invariably stop and examine the related-item display closely — which gives the salesperson in attendance a chance to step forward and demonstrate it.

The saleslady carries a "prospect book" which is used primarily to jot down the name of every customer willing to give it, whether or not she buys a small appliance. If she seems interested in a toaster, for example, the attempt to sell her is made immediately. If she cannot buy at once, the salesperson jots down her name and address, telling her that the store likes to keep on hand the names of all housewives interested in modernizing their kitchens or dinner tables with small appliances. Thereafter the prospect book allows Krauss Company to follow up her interest every three weeks over the telephone —calling up, telling the prospect what appliances are in stock, and suggesting that she may be able to buy now. Slack morning hours are used for this telephone selling —and literally scores of women who might never give the small appliance display another thought are encouraged to buy.

When a customer *does* buy a small appliance of any sort, this is considered the initial step toward more sales. Names entered in the prospect book of "sold" customers are marked with a symbol identifying the appliance purchased—and the saleslady follows up in this case by suggesting related appliances.

Cleaning Freezing Trays

Aluminum refrigerator freezing trays that have become discolored and stained from use can be given a bright new finish again by placing them in a strong solution of lye and water for a short time. After this treatment, they should be immediately flushed with clean water and the lye neutralized with vinegar.

Electrical Publications Of Interest to the Trade

Electrical Circuits and Machinery—Volume II

By Frederick W. Hehre and George T. Harness. Published by John Wiley & Sons, 440 Fourth Ave., New York. 635 pages, illustrated. Price, $6.00.

This volume deals entirely with alternating current. It supplements Volume I by the same authors relating to direct current circuits and machinery. One of the objectives of the authors has been the preparation of a textbook comprehensive enough to cover the many and ever-increasing fields of electrical engineering. The first six chapters treat the electrical circuits with a suitable emphasis on the polyphase circuit. The discussion of machinery is introduced with the transformer and conforms to current engineering practice. New methods of construction, such as strip-wound transformer cores, are discussed along with the theoretical and practical reasons for their use. A particular feature of the book is a large number of practical problems following each chapter. The book is generously illustrated.

Standard Handbook for Electrical Engineers

A new edition, the Seventh, of the Standard Handbook for Electrical Engineers is now available.

Much effort has been expended by the editors to make this new publication both practical and complete. By regrouping of material, recognition has been given to changes in relative importance of the branches of the electrical engineering field. Prominent among these changes is an expansion of the former section on power plant electrical equipment to include equipment for the whole power system. Notable also, are the basically new treatments of electronics and radio, interior wiring, illumination and prime movers. New material has been added to cover the modern developments in air conditioning, electricity in aviation and in the petroleum industry, high voltage generators and cyclotrons.

Particular attention is called to the physical changes in the new edition. The page size has been increased to 6 x 9 inches and the type has been enlarged. These innovations provide for more convenient handling and greatly improved readability.

The handbook is published by the McGraw-Hill Book Co., 330 West 42nd St., New York, N. Y.; Price, $8.00.

Menlo Park Reminiscences—Vol. III

By Francis Jehl. Published by The Edison Institute, Dearborn, Mich. 233 pages, illustrated. Price: paper covers, 50c; cloth covers, $1.00.

This is the third volume in a series by Francis Jehl who served as a staff laboratory assistant of Thomas Alva Edison at Menlo Park. The three volumes represent the most authentic account of the famous inventor's work. The three volumes, including a total of 1156 pages, contain not only the most important facts in the life and work of Thomas Alva Edison but also include many personal reminiscences that are available only because of Mr. Jehl's intimate association with the great inventor.

The third volume of this series holds especial interest for the electrical utility industry because it covers the period following 1881 directly after the Pearl Street Central Station in New York City had been constructed, the establishment of the first three-wire central station, and such other memorable mile-posts in the development of the industry.

On February 9, 1941, while engaged in completing the final chapters of Volume III of his Menlo Park Reminiscences, Francis Jehl, the sole survivor of the little group of men who had assisted Thomas Alva Edison at his invention of the practical incandescent

EFFECTIVE KITCHEN MODERNIZATION—Anniston Electric Company, of Anniston, Alabama, has made kitchen modernization one of its principal objectives. Guy O. Dill, vice president of the firm, recognizes that customers must be shown actual installations. This is the model kitchen installed in the firm's display room. A duplicate of it has also been installed in Mr. Dill's own home.

Famous Battles

INKING OF THE JAP BATTLESHIP "HARUNA"— The eroism of Captain Colin Kelly will live long in istory. Such self-sacrifice and bravery make Amer- ca proud, spur others on to emulate his feat. To the men at the front, all glory and honor! It's their due. The men serving on the "production front"— who build the "tools" so vital to Victory—are doing an all-important job, too. Getting this vital equipment where it is most urgently needed places an added responsibility on distributors and dealers. American Blower Distributors and Dealers are doing all in their power to speed deliveries, place fans, blowers, ventilators and heaters where they are needed most, furnish prompt, dependable service to keep the nation's war industries producing. You can count on their cooperation during this emergency.

AMERICAN BLOWER

AMERICAN BLOWER CORPORATION, DETROIT, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of AMERICAN Radiator and "Standard" Sanitary Corporation

lamp, passed away suddenly at St. Petersburg, Florida.

The intermittent day-by-day details that Mr. Jehl set down in book form represent one of the most important contributions to the story of pioneer electrical development.

How Other Men Manage

(Readers are cordially invited to make use of this department as a means of obtaining information on the problems they encounter in their work. Your questions will be identified only by a number. All readers having information on the questions asked are invited to submit answers. In sending answers, please refer to contributor's number published with the question. Payment of $3 each will be paid for all questions or answers published. Address your communications to the Editor, Electrical South, 1020 Grant Building, Atlanta.)

Can You Supply Answers To These Questions?

Contributor No. 1015: *"We are wondering what other motor shops use for cleaning off commutators after they have been soldered. We use acid for soldering and alcohol to clean it off afterwards. With the price of alcohol increasing, we are wondering if someone else has found another satisfactory neutralizing agent."*

Contributor No. 1020: *"I am familiar with the motors rated for 40 and 50 degrees temperature rise but will appreciate any information you can give me as to the allowable temperature rise in modern motors of both Class A and Class B insulation."*

Answers to Questions Published Previously

Contributor No. 1019: *"What is the melting point of half and half solder and pure tin solder, and which should be used for class B insulated windings?*

Answer: The half and half solder has a melting range of 181 to 231 degrees Centigrade (357 to 440 F.). This soft solder will start to soften around 181 C. The hard or pure tin solders have a melting range above 232 C. (449 F.). The tin solder melting point is more critical, i. e., it won't soften or run until a few degrees within the melting range. Thus for class B insulated windings that operate at temperatures above 130 to 160 C. a hard tin solder must be used to insure joints that are stable and free from softness of the solder at elevated temperatures.

Contributor No. 1021: *"What can be done to ease up the tight slot windings on some of the older a-c stator windings that have partly closed slots? The slots are so full that pounding the wires in causes short circuits. This increases the costs, results in lost and dissatisfied customers, particularly if the winding fails after leaving the shop.*

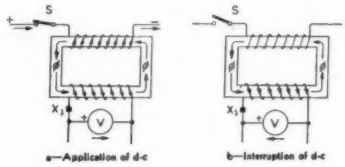
Answer: Use a size smaller wire with the new glass insulation and top the coil ends with .005-inch thick glass tape. Also use glass and mica combination slot insulation. This will increase the cost but the motor rating can be increased at least 7%. Sell customers on the increased safety factor and increased rating and raise the selling price accordingly.

Contributor No. 1027: *"I am endeavoring to find a simple means of determining the polarity of transformer windings, for use especially with relay and metering potential transformers. I have been told that there is a relatively simple method making use of direct current for the test but have been unable to obtain information on how this test is made. Your assistance on this will be appreciated."*

Answer: A method of checking potential transformer winding polarity by use of direct current was described in the April 1941 issue of the publication "Distribution," published quarterly by the General Electric Co. This method is most suitable, however, when the winding ratio of the transformer is particularly high.

This method depends upon the fact that an electromagnetic field always resists changes in magnitude, opposing increase and attempting to maintain its strength against decrease. For example, if a source of direct current is applied across the primary of the transformer as shown in the diagram, a magnetic flux will be set up in the core and will reach a steady value after a brief interval, the length of which will depend upon the circuit constants. While this flux is increasing, a voltage will be induced in both primary and secondary windings.

The induced voltage is the result of the mutual flux for both primary and secondary windings, and since the induced voltage opposes the applied voltage the direction of current in the secondary winding must be as illustrated in (a). Therefore, a d-c voltmeter, connected as shown, will deflect up scale.



If the switch is subsequently opened the mutual flux will decrease to zero but while it is decreasing a voltage is induced in both primary and secondary. In the primary the induced voltage will be in the same direction as the voltage which was applied, and the direction of current in the secondary winding will be as shown in (b). The d-c voltmeter will then deflect down scale.

In applying this method for determining the polarity, arbitrarily designate one secondary lead as X1 and connect the plus terminal of the d-c voltmeter to it.

If the voltmeter deflects up scale when the switch is closed the H1 terminal is that to which the positive of the d-c voltage is applied. Opening the switch will then cause the voltmeter to deflect down scale.

Conversely, if the voltmeter deflects down scale when the switch is closed and up scale when it is opened the H1 terminal is that to which the negative of the d-c voltage is applied.

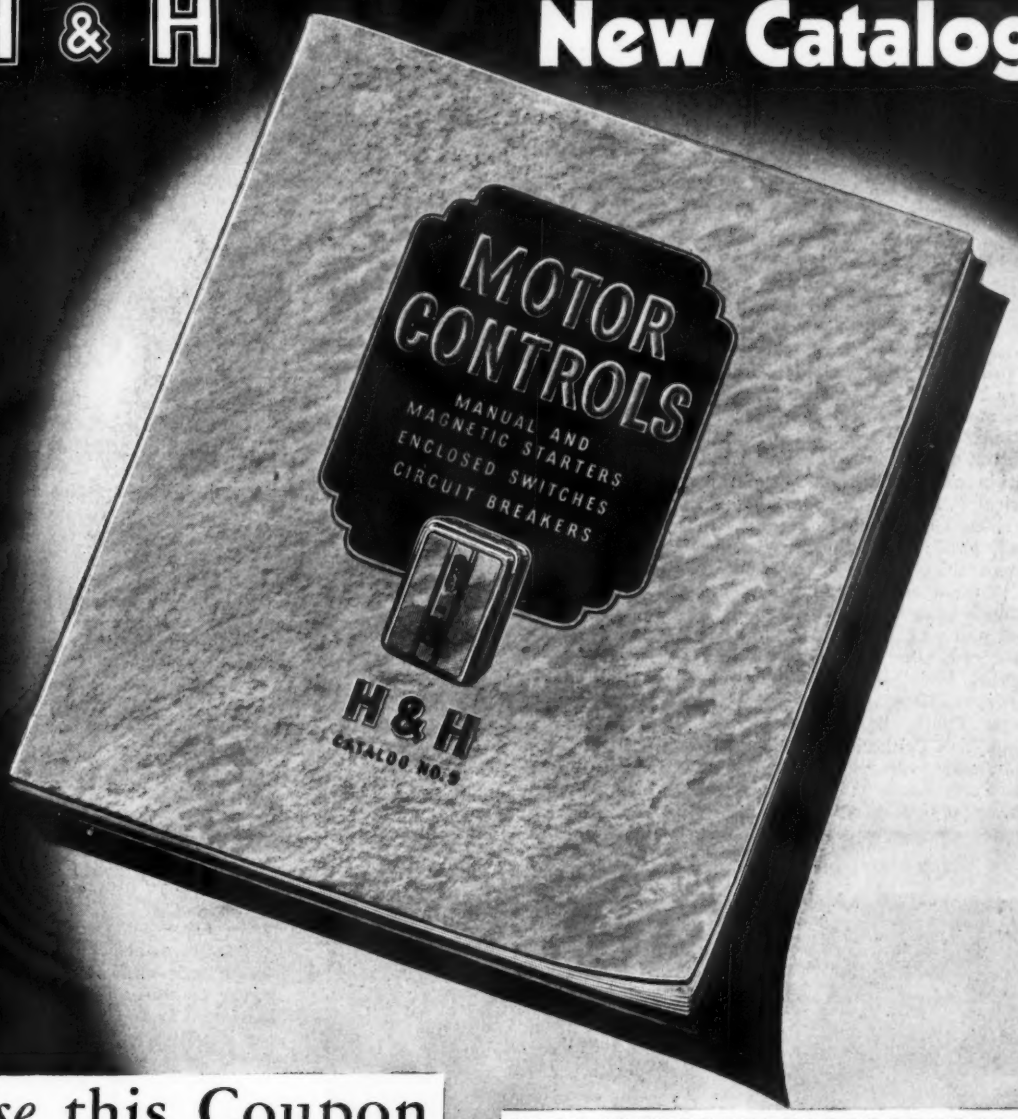
In this test, the d-c voltage should be comparatively feeble to avoid damage to the voltmeter needle from a violent negative swing against the stop.

●

Industrial Electrification

Because the entire March issue of ELECTRICAL SOUTH featured the subject of Industrial Electrification, the regular department under that heading is omitted this month. It will be resumed, however, in the next issue.

H & H New Catalog



Use this Coupon

to connect with a *full range* of Motor Controls for all jobs up to 50 H. P. Across-the-Line type Relays, Solenoid Starters, Magnetic Controls... Manual Starters, Safety Switches, Service Equipment, Master Devices, Contactors, Circuit Breakers... Carefully built, dependable mechanisms, engineered with a background of 51 years' experience in designing and developing electrical controls. Modern attractive designs, easily accessible parts, handy to wire.

Start action on your urgent requirements by mailing Coupon today.

To Hart & Hegeman Division, Arrow-Hart & Hegeman Electric Company, Hartford, Conn.

Send your new 100-page MOTOR CONTROLS Catalog No. 9 to

(*Name*)_____

(*Company*)_____

(*Address*)_____

(*City & State*)_____ 7

HART & HEGEMAN DIVISION

THE ARROW-HART & HEGEMAN ELECTRIC COMPANY, HARTFORD, CONN., U. S. A.

NEWS of the INDUSTRY
National and Southern

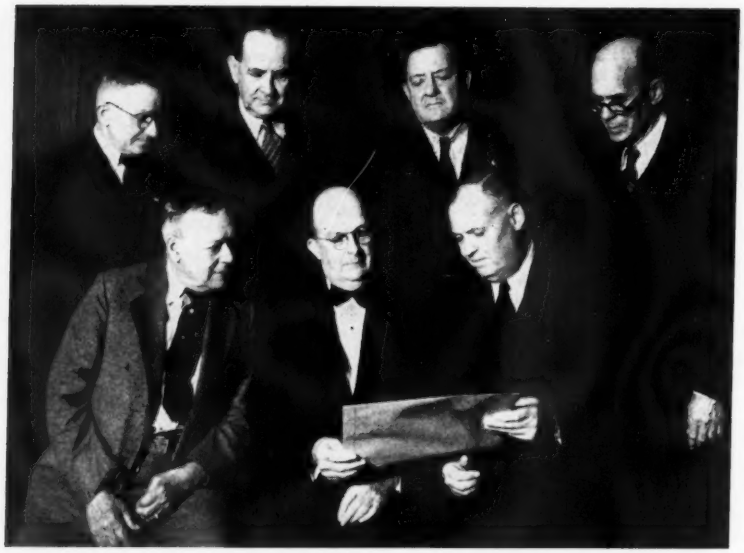
New Orleans Honors Electrical Veterans

Six pioneers of the New Orleans electrical industry were honored with presentation of "Golden Anniversary Fifty-Year Certificates" at a recent meeting of the Electrical Association of New Orleans in the St. Charles Hotel. It was the first presentation of certificates to veteran electrical engineers, industrialists, etc., since 1940, according to A. J. McCall, president of the association, although thirty pioneers have been thus honored since 1936, when the certificate plan was first adopted.

Two pioneers unable to attend because of illness or other reasons were presented with certificates by mail. They were Herman Blank of New Orleans Public Service, Inc., and William Von Paul, New Orleans utility engineer, who is now president of the Ford, Bacon & Davis electrical engineering firm in New York City.

Pioneers who attended were George B. Haygood, of New Orleans Public Service; W. W. Fee, of Louisiana Power and Light Company; Howard J. Jones, electrical contractor; John S. Moore, New Orleans Sewerage and Water Board Division; Matt S. Marr, New Orleans City Electrical Division; and Lyman C. Reed, of New Orleans Public Service, and former president of the Electrical Association.

All of these men have put in at least 50 years in electrical service to the city. Many began with the old Edison Company serving New Orleans, or the Southern Electric & Manufacturing Company.



Six of the eight members of the Electrical Association of New Orleans presented with certificates showing their 50 years of service and designating them as pioneers in the electrical industry are shown above with A. J. McCall, association president, who made the awards. Left to right, seated, are William Fee, Lyman C. Reed, and Mr. McCall, and standing, A. B. Haygood, Howard J. Jones, Matt M. Marr and John S. Moore. The other 50-year men are Herman Blank and William Von Phul.

Utility Preference Rating P-46 Revised

The War Production Board on March 26 issued a complete revision of Preference Rating Order P-46 which was issued last September to assist utilities in obtaining the minimum amount of materials necessary for maintenance, repair and operation. That order assigned a blanket preference rating of A-10 to such materials.

Today's order supercedes the original order and all amendments thereto and makes several important changes, the principal of which are:

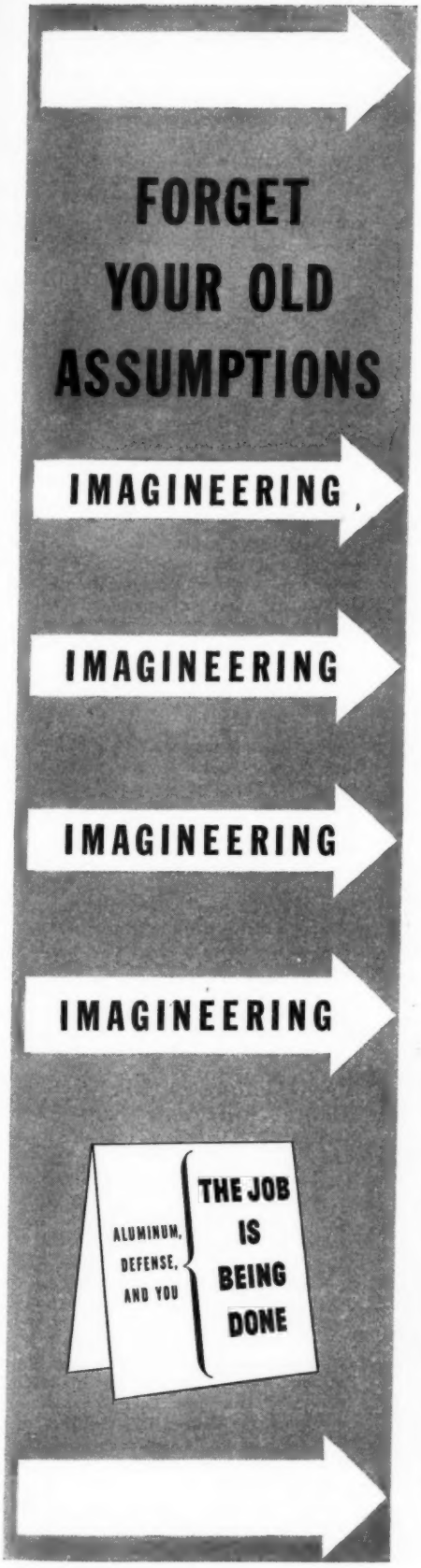
(1) The blanket rating of A-10 in the original order is replaced by two higher ratings. An A-2 rating is granted to deliveries of material for maintenance, repair and operating supplies for power plants and pumping plants. An A-5 rating is granted for all other facilities, such as lines, pipes and substations. One of the reasons for the distinction is that if a power plant or a pumping station breaks down, the whole system is put out of business. If a power line or a water pipe breaks, only a part of the system is affected. In either case, the rating is high enough to make possible prompt repair.

(2) The order also assigns a rating of A-5 to deliveries of materials to bring electricity, gas, or water to war plants or other projects bearing a rating of A-5 or better. This does not apply to housing projects. An A-5 rating is also granted to deliveries of materials needed to protect power or water plants against sabotage such as fencing, tear gas bombs for guards around such plants, etc. These ratings may not be applied without prior authorization from the Director of Industry Operations of the War Production Board.

(3) Line extensions to serve a new consumer are restricted to 250 feet. The original order permitted a 1,000-foot extension. Extensions begun prior to March 26, the date of issuance of this order, may be completed.

Despite this restriction, the Power Branch of the WPB announced that houses that were wired prior to March 26 or for which the foundations were completed by that date, may be served with electricity provided they are not more than 2,000 feet from an existing line and provided the utility specifies that galvanized steel wire will be used instead of copper.

This policy, which has been concurred in by the Steel Branch, will also permit extension of service to



IN THESE DAYS an advertisement is no place either for hosannas or sermons about production. Every man knows how well he is doing the job that is before him. Deeds, not words, are the measure.

BUT WORDS CAN BECKON beyond the realms of immediate duty.

IMAGINEERING is such a word. We coined it to make the needs of the future a reality, here and now. It is a way of describing what a man can do about the day when. . .

HOW DO YOU DO IT? You let your imagination soar and then engineer it down to earth. You think about the things you used to make, and decide that if you don't find out some way to make them immeasurably better you may never be asked by your customers to make them again.

YOU FORGET YOUR OLD ASSUMPTIONS. For instance, you may be one who used to assume that aluminum was too expensive. Even if you were right then (and you may not have been) the price trend of aluminum knocks those assumptions into a cocked hat.

WERE YOU ONE who used to assume that structures behaved exactly the way the theory said? Have you looked into the new answers the mammoth testing machine in the Aluminum Research Laboratory has found for that one?

DID YOUR OLD PRODUCT GROW like Topsy? More than one designer is Imagineering with this point of view: My product was in a groove. I couldn't get it out, because I didn't dare get too far away from last year's model. Now's my chance to start from scratch, and let tradition be hanged.

THAT IS THE KIND OF THINKING that will make jobs in the future. It is the kind we can help with: help with ideas and with know-how. Will you invite us?

Aluminum Company of America, 2164 Gulf Building, Pittsburgh, Pennsylvania.

ALCOA ALUMINUM

a number of homes which were already wired when the 1,000 foot extension limit was imposed last December 55.

The Power Branch made it clear, however, that extensions under this policy are not automatically approved, but that authorization must be obtained for each extension over 50 feet.

This policy will relieve special hardship cases where houses were wired in expectation of electric service which was subsequently denied because of material shortages. At the same time it will not result in the use of significant quantities of copper for line extensions. The Power Branch stated that the use of steel wire for electric extensions, in general, is concerned as an expedient only, and that customers served in this manner may not receive the most satisfactory class of service. It is felt, however, that this method of service in the special cases described is justified since this is the only means of providing electricity for these customers without the use of supplies of copper wire.

Two other changes in the order give utilities greater flexibility in obtaining delivery of materials.

1. Under the previous order restrictions were placed on the acceptance of deliveries of material in any quarterly calendar period. Often, through no fault of the utility, such materials were not delivered on the dates for which they were ordered. This provision has been changed to place the restriction not on the period in which materials are delivered but on the period in which they are scheduled for delivery.

2. Previously a utility could not obtain certain items which it needed if the dollar value of the items on hand within the same class exceeded a practical working inventory. This has been changed to permit a limited amount of deliveries of needed items.

Appliance Credit Sales Affected by New Order

As a further step in restraining the expansion of installment credit at this time, the Board of Governors of the Federal Reserve System has adopted Amendment No. 3 to Regulation W, effective March 23, 1942. The principal changes made by the amendment are as follows:

The standard maturity is reduced from 18 to 15 months for all credits subject to the Regulation, except credits for residential modernization, plumbing, furnaces, water heaters, water pumps, and pianos, all of which may still be for 18 months.

The down payments are increased from 20 per cent to 33-1/3 per cent on refrigerators, washing machines, ironers, vacuum cleaners, electric dishwashers, room unit air conditioners, sewing machines, radios and phonographs, and musical instruments. On home air conditioning systems and attic ventilating fans, the down payments are increased from 15 per cent to 33-1/3 per cent, and on furnaces, water heaters, water pumps and plumbing, from 15 per cent to 20 per cent.

The following articles are added to the list, with 33-1/3 per cent down payment required: bicycles, lawn mowers, silverware and photographic equipment. The following are added to the list, with 20 per cent down payment required: clocks, watches and floor coverings.

Any lender or vendor who becomes subject to the Regulation because of the addition of articles is given until June 1 to register with the Federal Reserve Bank in his district on forms obtainable at any Federal Reserve Bank or branch. These new registrants are granted a general license between March 23 and June 1.

"Unfreezing" of Dealers' Refrigerator Stocks

Amending a previous order which had frozen all retailers' and distributors' stocks of mechanical refrigerators, the War Production Board recently announced that effective March 26 retailers may sell new mechanical domestic refrigerators from their stocks without restrictions.

Further changes in the earlier freezing order are as follows: Any refrigerators may now be sold or delivered for physical incorporation into defense projects or defense housing bearing an A-10 priority rating, providing order was placed before February 13, 1942. Dealers may sell new gas or kerosene domestic refrigerators to distributors or manufacturers.

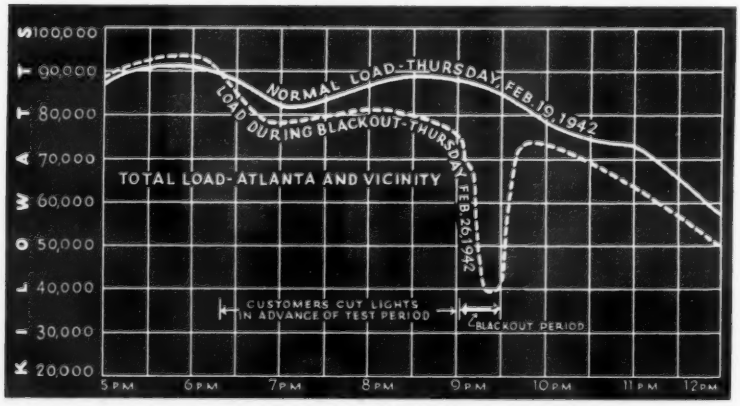
Distributors may sell new electric refrigerators back to the manufacturers, or from stock to any application bearing an A-10 or better priority rating; or a distributor may sell at retail a proportion of his stock which bears the same percentage relation to total stock as his retail sales for 1941 bore to his total 1941 sales (a distributor may sell 50 per cent of his stock at retail if in 1941 his retail sales represented half of his total sales.) Distributors also may sell gas or kerosene refrigerators to manufacturers.

Price Ceiling on All Major Appliances

In the broadest action yet taken to combat price inflation, the Office of Price Administration put a price ceiling (effective March 30) on mechanical refrigerators, vacuum cleaners, stoves and ranges, washers and ironers, radios and phonographs.

The ceiling on radios, phonographs, washers and ironers and stoves and heaters will be the highest net price at which each model was sold on March 19, or if no sale was made on March 19, then on the nearest previous date to March 19. Ceiling applied to vacuum cleaners and refrigerators is the manufacturer's recommended retail price on each model which prevailed during the period October 1-15, 1941.

The OPA order also freezes the



HOW BLACKOUTS AFFECT LOAD CURVE—The broken curve on the chart shows how the electric load in the Atlanta area reacted during the blackout on February 26, when lights within the city limits of Atlanta, Decatur, College Park and Fort McPherson were extinguished in an initial test. The solid curve represents a normal evening load in the area, taken one week earlier on February 19. The maximum decline in load was 45,000 kilowatts, and the estimated decrease in energy consumption was 95,000 kilowatt hours. The warning sounded at 9:05 p. m., the "all clear" at 9:30 p. m. (Photo courtesy Georgia Power Co.)

OUR *Heart's* IN THE WAR *but our* EYE *is on peace*

THE machines and men, the management and factories which have helped *to free women from laborious housework* are now enlisted to help in Uncle Sam's fight for a greater freedom. All the appliances we can build are now flowing into America's war effort. Every foot of floor space, every bit of capacity in our three big plants which is not utilized for production of our regular products is devoted to war work.

Hotpoint has also *purchased a big new factory* in which to manufacture war materials for our armed forces. With our heart in the war and our eye on peace we are all out for Victory. With that won, our facilities for peace-time manufacture of Hotpoint Electric Appliances will be bigger than ever.

Hotpoint continues its advertising in National Magazines

To fit the new wartime tempo Hotpoint will continue to advertise, giving your customers essential information about the appliances they are now using. We are telling them about Hotpoint's contribution to America's war effort so they will understand why they can't get new appliances and will realize the importance of caring for their present appliances. Hotpoint's advertising continues to acquaint your public with the advantages of electric service in the home. Edison General Electric Appliance Co., Inc., 5614 W. Taylor St., Chicago, Ill.

Hotpoint

ELECTRIC RANGES

REFRIGERATORS · WATER HEATERS · WASHERS · IRONERS
DISHWASHERS · DISPOSALS · ELECTRASINK · STEEL KITCHEN CABINETS

Thoughts at a Glance

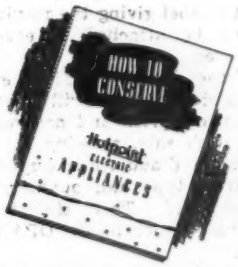
★

ALL Americans now realize that *each of us must do more to win the war;* and everybody is eager to do his extra bit to support our fighting men.

Hotpoint has gladly accepted its big opportunity to convert the machines of peace to those of war. Our three great factories have been enlarged. Production has been speeded. Our war efforts have reached such an important scale that the purchase of large additional plants has become necessary.

Hotpoint's enlarged facilities for war has launched an expansion program which will be ready to take care of vast civilian demands for Hotpoint products when the war is over.

Vice-President



Hotpoint's New Book Will Be Advertised Nationally

"How to Conserve with Hotpoint Electric Appliances" gives valuable information to your customers. To secure widest distribution it is featured in our national advertising. Be sure to have a supply on hand. Ask your Hotpoint distributor.

E. L. PHILPOT

Assistant Secretary and Assistant Treasurer
W. R. C. Smith Publishing Co.

Elmer Leonadas Philpot, he had been named by his proud parents soon after his birth in the small mid-Georgia village of Harrisonville, on October 23, 1891. But the boys called him "Phil"; and it was by this name that he was known and loved by a host of friends until his sudden, untimely death on March 3, only two days after the death of his father.

Leaving Harrisonville as a young man, Phil acquired a commercial school education, then entered the hardware business. For some years he served as bookkeeper and accountant for Beck and Gregg Hardware Company, in Atlanta. In September, 1918, Phil joined the W. R. C. Smith organization as bookkeeper. Through the years he advanced to the positions of office manager and credit manager until at the time of his death he was a director and assistant secretary and assistant treasurer of the company.

He will be remembered by all who knew him as a friendly, cheerful man of even temperament and optimistic spirit, one who dealt generously with others in both word and deed. He will be remembered also by his associates as a capable financial officer with an outstanding record in handling finances as well as credit and accounting problems; as a willing, helpful friend of keen understanding and excellent judgment; and as a very human individual with an unusual sense of humor, generously applied in his business, in his golf, and in all his contacts. Phil was a friend to all who knew him.

price margin of wholesale distributors of vacuum cleaners and refrigerators to that prevailing during this same period.

The orders covering radios, washers and ironers, phonographs, stoves and heaters were issued as 60-day "temporary orders." The orders applying to vacuum cleaners and refrigerators are permanent regulations.

Dealers are required to post in a conspicuous place in the store "a legible notice setting forth the make, model number, and maximum price of every model offered for sale." An exception is vacuum cleaners, in which case no posting is required but a label giving the maximum price must be attached to each vacuum cleaner.

From March 30, 1942, every dealer and distributor will be expected to keep complete and accurate records of each sale, showing date thereof, name and address of buyer, price received, type and quantity of appliances sold. These shall be available for inspection by the OPA if requested.

As is true of other orders issued by OPA under the Emergency Price Control Act, willful violation makes the violator liable to fine of as much as $5,000, or imprisonment for not more than one year, or both.

Progress Made in IAEI Membership Campaign

New members have been inducted into the Southern Section, International Association of Electrical Inspectors, at a rapid rate during the past month. A membership campaign begun directly after the Section's annual meeting in October has resulted in the addition of 47 new members. Members of the section credited with signing up the new members are listed below:

Bagwell, H. O. Carrollton, Ga.	1
Boger C. A., Charlotte, N. C.	1
Bommer, A. J., Dallas, Texas	3
Bushnell, R. O., Miami, Fla.	2
Byrum, R. L., Greensboro, N. C.	1
Campbell, R. D., Asheville, N. C.	2
Camus, F. G., Shreveport, La.	1
Eberling, J. H., Houston, Tex.	1
Edwards, Steve, Quincy, Fla.	1
Edwards, T. W., Jacksonville, Fla.	1
Fisher, Jack, Jackson, Miss.	7
Flynt, H. F., Winston-Salem, N. C.	1
Earle B. Guess, Jackson, Miss.	2
Hancock, A. E., Austin, Tex.	1
Harpster, R. L., West Palm Beach, Fla.	1
Hayes, Ray, Corpus Christi, Texas	1
Hendricks, R. B., San Antonio, Texas	1
Houston, O. A., Durham, N. C.	1
Jones, C. M., Atlanta, Ga.	1
Julian, L. H., Salisbury, N. C.	1
McConnell, E. S.	1
Muellier, R. W., Ft. Lauderdale, Fla.	1
Miller, C. M., Richmond, Va.	1
Peeples, Troy, Roby, Texas	1
Rousseau, C. C., Salisbury, N. C.	2
T. W. Sampson, Jr., Jackson, Miss.	1
Stall, W. A., Jacksonville, Fla.	1
Stanford, A. G., Atlanta, Ga.	1
Welman, Geo., New Orleans, La.	1
Whitaker, C. S., Durham, N. C.	5
Whiting, C. T.	1
Total	47

General Electric Opens Repair Parts Warehouse

Recognizing that service on all appliances will become increasingly important as the present emergency develops, General Electric Company has established a new part and service warehouse in Atlanta, Georgia, as part of its broad program to meet the new conditions that face their appliance and merchandise distributors and dealers. The new warehouse, a four-story concrete building having approximately 20,000 sq. ft. with a 50 ft. frontage, is located at 49 Auburn Avenue, Atlanta.

In charge of the new warehouse will be Paul Graves, district service supervisor for the Appliance and Merchandise Department, and M. F. Donohoe, manager, formerly the Home Laundry Equipment representative in the Southeastern territory. The functions of the new warehouse will be to stock parts for General Electric appliances, to stock replacement refrigerator units, and to provide repair service on General Electric appliances.

Present indications are that the opening date will be approximately April 15 for the handling of supply parts orders and as soon as possible thereafter for the handling of repairs. The territory covered by this warehouse will include the following General Electric distributors: L. W. Driscoll, Inc., Charlotte, N. C.; W. D. Alexander Company, Atlanta, Ga.; General Electric Supply Corp., Nash-

SOMETHING NEW ADDED TO HYGRADE LINE—Two new sizes recently added to Hygrade Sylvania Corporation's fluorescent lamp line are the 6-watt and 8-watt lamps. These small members of the Hygrade fluorescent family are designed for supplementary lighting purposes; for example, for instrument panels, in counter lighting and over machinery. They are also suited for a wide range of other uses: Bed lamps, pin-up lamps, desk lamps, and for artistic direct or indirect illumination of mirrors, pictures, walls, etc. The 6-watt lamp is 9 inches long and the 8-watt lamp is 12 inches long. Both are T-5's or 5/8 of an inch in diameter.

INDUSTRY ANSWERS THE CALL!

A WAR MESSAGE
to
ALL EMPLOYERS
★ From the United States Treasury Department ★
A PAY-ROLL SAVINGS PLAN
WHAT THE PAY-ROLL SAVINGS PLAN DOES
U. S. Defense BONDS ★ STAMPS
This space contributed to National Defense by
YOUR NAME HERE

32,145 Firms With Over 17,700,000 Employees Have Installed the . . .

PAY-ROLL SAVINGS PLAN

Have YOU Started the Pay-Roll Savings Plan in YOUR Company?

Like a strong, healthy wind, the Pay-Roll Savings Plan is sweeping America! Already more than 32,000 firms, large and small, have adopted the Plan, with a total of over seventeen million employees—and the number is swelling hourly.

But time is short!. .**More and more billions are needed, and needed fast, to help buy the guns, tanks, planes, and ships America's fighting forces *must* have. The best and quickest way to raise this money is by giving *every* American wage earner a chance to participate in the regular, systematic purchase of Defense Bonds. The Plan provides the one perfect means of sluicing a part of ALL America's income into the Defense Bond channel regularly every pay-day in an ever-rising flood.**

Do *your* part by installing the Pay-Roll Savings Plan *now*. For truly, in this war, this *people's* war, VICTORY BEGINS AT THE PAY WINDOW.

Plan Easy to Install

Like all efficient systems, the Pay-Roll Savings Plan is amazingly easy to install, whether your employees number three or ten thousand.

For full facts and samples of free literature, send the coupon below—today! Or write, Treasury Department, Section C, 709 Twelfth Street NW., Washington, D. C.

MAIL THIS COUPON NOW

Treasury Department, Section C
709–12th St., NW.
Washington, D. C.

We want to do our part. Please rush full information regarding the Pay-Roll Savings Plan.

NAME .....
POSITION .....
COMPANY NAME .....
ADDRESS .....
NUMBER OF EMPLOYEES .....

MAKE EVERY PAY-DAY . . . BOND DAY!

U. S. Defense BONDS ★ STAMPS

This space is a contribution to NATIONAL DEFENSE by ELECTRICAL SOUTH

GPO 16—26944-1 Form No. DSS-280

ville, Tenn.; General Electric Factory Distributing Branch, Tampa, Fla.; Perry Mann Electric Company, Inc., Columbia, S. C.; and Matthews Electric Supply Company, Birmingham, Ala.

Priority Provision for Wholesaler Stocks

Wholesale distributors of electrical and other essential supplies will receive priority assistance in maintaining stocks of such supplies through the use of a new application form, PD-1X, which is expected to be available soon after the first of April.

"Insofar as materials and supplies can be made available without interfering with the war effort, priority assistance will be given to distributors, wholesalers, etc., who apply on the new form so that they can keep sufficient stocks on hand to maintain essential productive and service industries in operation," the War Production Board reports. "Use of the new form will enable distributors to request preference ratings for essential supplies without receiving or extending a rating on every individual order which they fill.

"Distributors, wholesalers and jobbers who purchase the following supplies from producers will be entitled to apply for preference ratings on Form PD-1X: Automotive supplies, aviation supplies, builders supplies, construction supplies, electrical supplies, foundry supplies, hardware supplies, health supplies, industrial supplies, plumbing and heating supplies, railroad supplies, refrigeration supplies, restaurant supplies, transmission supplies, textile mill supplies, welding and cutting supplies."

Metermen's Association to Meet in Gainesville, Fla.

The twentieth annual meter conference sponsored by the University of Florida and the Southeastern Metermen's Association will be held this year during the week of May 4, 1942. The meeting as in the past will be held at the University in Gainesville, Florida, according to announcement by B. Z. Segall, president of the association.

The program this year will be of considerable interest. Representatives of the Edison Electric Institute's committee will be on hand to present the standardization program of the meter committees. E. S. McConnell, technical advisor for the Wiring Sales Committee of the Institute, will bring a timely message on wiring and related activities. M. C. Miller and A. L. Carvill of the Ebasco Services will present papers. The Underwriters' Laboratories will send several of their representatives to the meeting. Meter manufacturers will have an important place on the program.

PERSONAL NOTES
About Men You Know

B. W. Clark, vice president in charge of the Westinghouse Electric and Manufacturing Company's merchandising division, was appointed vice president in charge of sales of the Company. He succeeds **Ralph Kelly,** who resigned to become executive vice president of the Baldwin Locomotive Works.

George H. Bucher, president of Westinghouse, announced that Mr. Clark, in addition to supervising the sale of apparatus, will be responsible for coordinating all sales of the Westinghouse Company and its subsidiaries. He will transfer his headquarters from Mansfield, Ohio, to Pittsburgh, Pa.

B. W. Clark

Mr. Clark, who is also president of the Westinghouse Electric Supply Company, was born in Gagetown, New Brunswick, Canada. He spent his early years in Adrian, Michigan, and attended the University of Michigan.

He has been engaged in electrical wholesaling and merchandising for 35 years. In 1906 he joined the Robertson-Cataract Electric Company at Buffalo, N. Y. In 1925 Mr. Clark became a special representative of the Westinghouse Electric Supply Company, and four years later he was made general manager. In 1932 he was made vice president and director, and five years later was elected president of the Supply Company.

Mr. Clark was elected vice president of the Westinghouse Electric and Manufacturing Company in January, 1941, heading its merchandising activities.

* * *

W. E. Mallicote, formerly salesman at the Knoxville branch of the Graybar Electric Company, was appointed sales manager of the Chattanooga office in February. He replaces **C. C. McGraw,** who has been called into military service.

Mr. Mallicote joined Graybar in 1928 as Warehouse Clerk at the Knoxville branch. Subsequently, he served at the City Counter and in the Service Department until 1934 when he became Salesman.

* * *

Announcement has been made by **Charles E. Wilson,** president of General Electric Company, Schenectady, of the election of **W. B. Clayton,** district manager at Dallas, Texas, to the office of commercial vice president. This promotion comes to Mr. Clayton after a period of long service with General Electric. He joined the company in 1905, in the testing department at Schenectady, shortly after graduating from Alabama Polytechnic Institute with a degree in electrical engineering at the age of only 17.

Mr. Clayton was sent to Dallas in 1911, joining the Southwest General Electric Company, and was made manager of the central station department when the southwest district was formed in 1924. In 1929 he was appointed assistant district manager; and in 1939, following the promotion of L. T. Blaisdell to the Cleveland office, Mr. Clayton was made southwest district manager, which position he continues to hold.

W. B. Clayton

He served in World War I as a captain in the Army. He is active in Dallas civic, club and fraternal work, including the Dallas Electric Club, of which organization he is first vice president.

* * *

John H. Varnum, for more than eight years advertising manager of the Switch & Panel Division, Square D Company, Detroit, Mich., leaves

Larrowe Milling Company, division of General Mills, Inc., to return to his former connection. He will be located at Detroit.

* * *

Chas. G. Pyle, general sales manager of the Lighting Division of the Hygrade Sylvania Corporation, has just announced that effective February 1, **R. F. Hartenstein,** formerly director of lighting of the Ohio Edison Company, Akron, Ohio, has become associated with the Hygrade Sylvania Corporation as a special

R. F. Hartenstein

representative. Mr. Hartenstein will spend the major part of his time contacting the commercial departments of the various utilities throughout the United States. For the time being, Mr. Hartenstein will make his headquarters at the New York office of the Hygrade Sylvania Corporation, located at No. 500 Fifth Avenue.

* * *

Central Power and Light Company lost a great friend March 9 with the passing of **James C. Kennedy,** president of the company from 1932 to 1939, and member of the board of directors until the time of his death. The former president, who was a pioneer in power development in the Southwest, died while on a visit at Bayview, near San Benito, and was buried in Corpus Christi, March 10.

Mr. Kennedy obtained his master of arts degree from St. Stanislaus College, Bay St. Louis, Mississippi in 1895. He then attended Tulane University, New Orleans, for two years, being awarded a certificate in engineering.

From 1899 to 1905, he held various jobs, the first was an oiler in a power plant in New Orleans, then to San Antonio as switchboard operator at a plant of the predecessor company to S. A. P. S. Co. He installed the first power plant at Gulfport, Miss.

From 1911 to 1918, he managed utility properties at Brenham. During World War I he was a captain in the United States Army and was fuel administrator for South Texas, later being placed in charge of utilities at Fort Sam Houston. He served about eight months until the Armistice was

(*Continued on page 48*)

HE'S "HEARING VOICES"

in a Plant that's Still on Paper

To convert a building full of machines into a close-knit productive enterprise, a lot of voices have to be heard from. Instructions . . . requests . . . information . . . orders . . . assurances.

Often, the difference between serious confusion and orderly communication hinges on a man like this . . . one who can "hear voices" while the plant is still on paper, and plan signaling and intercommunication systems so as to save time, save steps and speed production.

GRAYBAR Signaling Specialists are highly experienced in planning new systems for communication or alarm service. They bring together a broad-gaged knowledge of *how best to use* interior telephone systems, amplified communication speakers, coded-signal paging calls, public address systems, and other communication, signaling or warning devices.

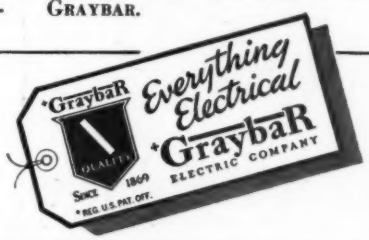
The services of these men . . . like that of GRAYBAR Specialists in industrial lighting, power distribution and other electrical fields . . . are among the "extras" you get as a customer of GRAYBAR.

GRAYBAR

in over 80 principal cities

Executive Offices:

GRAYBAR BUILDING, NEW YORK



"Gorilla Grip" Mechanical Connectors may be quickly adapted to meet unusual requirements. Every day new "Gorilla Grip" combinations are being discovered to meet critical situations. Make-shifts are not necessary. The Terminal Units are minutely machined to fit just one conductor size, however, one Terminal Unit will precisely fit nineteen various types of lugs, taps and connector bodies. These connector bodies will take as high as nineteen different Terminal Units or wire sizes.

A "Gorilla Grip" stock set assembled for your particular need is good insurance against electrical connector breakdowns. Ask for literature.

National Electric
PRODUCTS CORPORATION
300 FULTON BUILDING, PITTSBURGH, PA.

NEW EQUIPMENT and MATERIALS

Universal Display Cards

Universal's Mixablend display card in eye-catching colors emphasizes the distinctive features of this product. Offered to dealers for point-of sale merchandising, this display

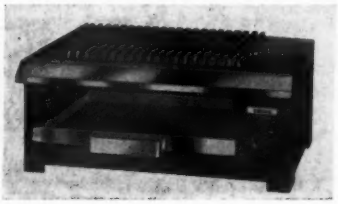
acquaints prospective buyers with the innumerable tasks performed by the Mixablend . . . liquifying of fruits and vegetables for health drinks, mixing of light batters and icings, blending of all kinds of drinks, and pureeing of fruits and vegetables for infants.

Hotpoint Electric Broiler

"Charcoal broiling" without the inconvenience and expense of charcoal and with the certain automatic temperature control that is possible only with electric heat makes Hotpoint's new Heat Manager Electric Broiler a welcome addition to the cooking equipment of every public eating place, large or small.

Built to withstand heavy duty service, its Calrod units are cast solidly into the barred broiling surface of the grid, which measures 18 inches in width and 12 in depth. With overall dimensions of 23½ x 17-1/8 inches, this broiler can be installed easily and quickly without rearranging kitchen equipment.

Heat is controlled by a thermostat which holds the temperature at the ideal degree for a perfect product. The grids impart to the steak the markings that characterize the real charcoal broiled steak. Listed as the B16 Broiler, it is to be had in standard voltages — 115, 208, or 230 — either single-phase or direct current.



Silex Light Test

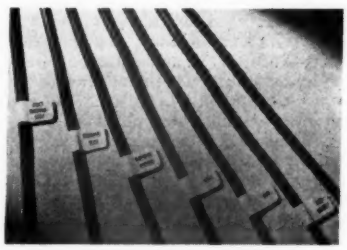
Millions have seen advertisements featuring the Silex "Light Test" since its introduction last May. Designed to show the consumer that Silex is thoroughly filtered, and thus fully aromatic and flavorful, the light test has become synonymous with Silex-brewed coffee.

The light test is based on the fact that the consumer knows that clear coffee is better coffee. Silex's patented Spring Tension Filter locks out all taste-spoiling particles, all grounds and sediment, leaving the coffee perfectly clear and rich flavored.

Silex has consistently featured the light test in all its advertisements and sales material, has found that it helps to identify and to sell Silex products. The coming year will see an even greater emphasis placed on it throughout Silex's nation-wide promotions.

Circuit Identification

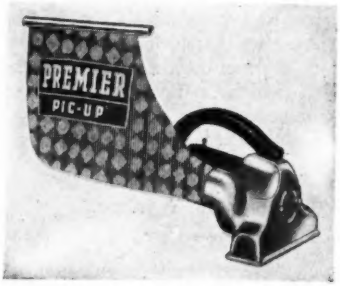
A new type sticker is being used widely in the electrical field to identify wires for installations, carry instructions, warnings, patent numbers and manufacturer's identification. These new stickers, applied without moistening, permanently adhere to any smooth surface, and never pop off even under extreme heat or humidity, yet may be easily pulled off without leaving a mark.



They are available blank or printed to specification, and are manufactured by Avery Adhesives, 451 East Third Street, Los Angeles, California.

Premier Hand Cleaner

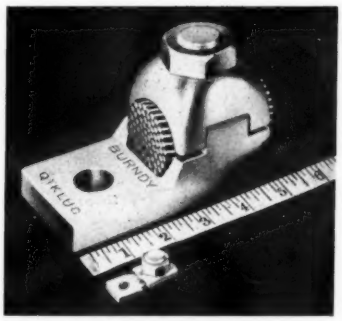
Premier Division, Electric Vacuum Cleaner Co., Inc., Cleveland, Ohio, has recently introduced to appliance dealers their Model 52 Premier Hand Cleaner with Tenite (plastic) nozzle. It is considerably lighter in weight than was the "pre-plastic construction" and has a lustrous-gray finish contrasted by a maroon crinkle-finish



motor housing. It also has a full ball bearing, 175-watt motor that requires no oiling; ball bearing, motor-driven brush; Underwriters' approved rubber-covered cord with molded rubber plug; conveniently located finger-tip switch; and specially-woven sateen dust bag with trap in throat that prevents dirt from spilling on floor when it is removed for emptying.

Burndy Quiklug

A new, cast Quiklug for electrical cable terminal connections, is now being manufactured by Burndy Engineering Co., Inc., of New York City. This terminal connector QA(-)B takes a wide range of conductor sizes, is very compact and is provided with serrations on cable clamping elements on all but the very small sizes.



Only eleven sizes of Quiklugs are needed for all conductor sizes from No. 14 sol. to 2000 MCM—actually as many as twelve different sizes of cable can be accommodated by some sizes of Quiklugs.

Tips Pole Platform

A new Economy Platform has been cataloged by the A. B. Chance Company. This is a low priced platform for use where linemen would otherwise be required to stand in their climbers for long periods, where work-

IMPORTANT NEWS FOR YOU —ON R&M FANS!

It's generally accepted that there'll be a far greater demand for quality fans this summer than the industry can supply. For this reason, you'll be smart to order R & M fans *right away!*

Even though we are mighty busy with war production—at least for the time being we are able to make shipments of fans to our distributors. Just how long this condition will last, and exactly how *many* fans we shall be able to make, are questions nobody can answer. But we do believe that we shall be able to fill most of those orders that come in *soon*.

Play safe by letting your distributor know *now* just how many R & M fans you will want! The sooner he gets your order—for immediate delivery—the better position he will be in to see that you get your fair share.

You have our word that the fans we *do* make will be as *fine as ever* in construction, performance, efficiency and durability. And considering higher production costs and higher taxes, they'll be better values than we've ever been able to offer in the past.

Get in touch with your R & M fan distributor *now*. If you don't know the name of the distributor nearest you, write us at the factory or ask the nearest R & M Branch Office listed below.

Retail prices—including Federal Excise Tax—of 1942 desk models (60 cycles, A. C.) are listed here for your convenience:

BANNER FANS	STANDARD FANS	DELUXE FANS
8-inch, $4.75	10-inch, $15.25	10-inch, $19.05
10-inch, $12.35	12-inch, $30.60	12-inch, $34.35
12-inch, $19.05	16-inch, $37.20	16-inch, $41.00

Doing Our Best for America!

☆ R & M fans are serving in Army Camps, on shipboard, and in Army and Navy Hospitals. R & M Motors, Hoists, Cranes, Moyno Pumps and Machine Tool Drives are speeding production in countless armament industries. ☆

ROBBINS & MYERS • INC.

SPRINGFIELD, OHIO • Branch Offices in:

NEW YORK, 200 Varick St. CHICAGO, 2400 W. Madison St. PHILADELPHIA, 401 N. Broad St.
KANSAS CITY, 2105 Grand Ave. NEW ORLEANS, 500 Camp St. DALLAS, 1100 Cadiz St.
SAN FRANCISCO, 237 Rialto Building
THE ROBBINS & MYERS CO. OF CANADA, LTD., Brantford, Ont.

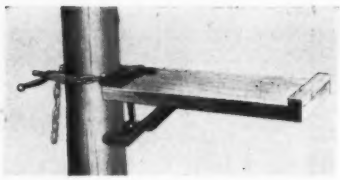
HOW TO BEND
1¼-4½ in. PIPE
3 TIMES FASTER

If you bend conduit and pipe with obsolete bending equipment or clumsy makeshift methods, Greenlee Hydraulic Benders can save you as much as 75% in bending time. Greenlee Benders, with their powerful hydraulic units, bend 3 times faster because they're easier for the man on the job to operate. The No. 770 Bender, shown above, has a maximum pressure of 25 tons for bending 1¼ to 3-inch conduit, while the larger No. 775 Bender with a maximum pressure of 40 tons will handle 3 to 4½-inch material. There's also a complete selection of Greenlee hand benders for tubing up to ¾-inch. Write for new S-116 Bender Booklet . . . it'll show you how to save time and money on every bending job.

★ HERE'S WHY YOU SAVE TIME WITH GREENLEE BENDERS

- ✓ One man can easily and quickly develop the pressure needed to bend conduit up to 4½ inches.
- ✓ You save cost and time of installing many manufactured bends and fittings.
- ✓ You eliminate expense and delay of cutting and threading nipples.
- ✓ The smooth, even bends made by Greenlee, eliminate wasted time when pulling in wire.
- ✓ The Greenlee, built in one unit, is easily carried to the job and set up and is easier for operator to handle.

GREENLEE TOOL CO.
1764 Columbia Ave., Rockford, Illinois



ing space is limited, or where maximum economy is desired. This platform is easily attached to the pole by the use of a single chain tightener. It is sufficiently strong to support the weight of one man and has been tested to loads of 850 pounds without breaking the board. This platform is available in 24 inch and 30 inch lengths.

A special short railing is made to provide additional safety for men working on Tips Economy Platforms. It assists linemen in maintaining balance and provides for freedom of movement while working. This pole railing is collapsible and easily applied.

Folder on Protective Lighting

A timely and interesting folder entitled "Plant Protection Begins with Floodlighting" has just been released by the Goodrich Electric Company, Chicago, Ill. Dealing with the present and urgent need for protective lighting around industrial plants, this folder illustrates the various styles of porcelain enameled floodlights available to meet the demands for illumination in different locations. All equipment listed are in accordance with FBI specifications.

Personal Notes About Men You Know—

(*Continued from page 45*)

signed, at which time he applied for a discharge to take a job with American Public Service Co., at Dallas.

From Dallas he moved to Marshall, Texas, in 1923, to assemble a large group of utility properties in East Texas which was known as the East Texas Public Service Company, subsidiary of APS, and now known as the Southwestern Gas and Electric Company. He served as president of this company until 1926.

In 1925 he was assigned to negotiate the purchase of CPL properties.

Early in 1926 he moved to San Antonio to manage these properties as president, now owned and known as Central Power and Light Company, and in October of the same year he moved to Dallas as president of the American Public Service Company and Central and South West Utilities Company, which was at that time a supervising organization for CPL, as well as other large utility companies in Texas, Louisiana, Oklahoma and Arkansas. From 1926 to 1932 he relinquished his presidency of CPL but when he moved to Corpus Christi in December, 1932, he was again made president of the company, serving seven years..

For Victory Keep Them Flying—

(*Continued from page 23*)

answer to the family's need.

You will then be making a real contribution to our war effort, by helping to bolster the morale of our people and in assisting in the utilization of the surplus manufacturing and merchandising capacity of America to the end that there will be a maximum national income out of which to meet the expenses of insuring our future as a free people.

Industrial Wiring Practice—Part 4

(*Continued from page 19*)

The supply voltage now is approximately equal to the load voltage plus the total IZ drop, viz., $240 + 5.28 = 245.28$. For the circuit used, if the load power factor had been the same as the inherent feeder power factor, i. e., 59.09% instead of 50%, then the IZ drop would have been in phase with the load voltage and the voltage drop would have been a maximum value. From these calculations the limits may be fixed for the voltage drops for any one feeder loaded at a constant current value but at varying power factor conditions.

Broadly stated, the rule is that for any load power factor value above the inherent power factor of the feeder circuit itself, the voltage drop varies from a maximum equal to the feeder impedance (IZ) drop to a minimum approximately equal to the IR drop. This minimum value is reached at a point where the load power factor is about 100%. If the load power factor decreases below the inherent feeder power factor the voltage drop approaches the reactance (IX) drop as a minimum limit.

Telephone Selling Replaces Sales Crew

(*Continued from page 25*)

to be put through a month of intensive training on all aspects of appliance merchandising. She learned how appliances are made, the selling points of one brand compared with another, how they are reconditioned, prices, etc. Then she was given a desk and a telephone and complete information on the store's appliance lines,

KEEP THEM RUNNING!

Specify OHIO CARBON BRUSHES

● Your Motor Repair Jobs are as good as the Brushes you use. When you have completed the Motor Repairs necessary for your customer, complete the job with the time-tested Carbon Brushes available. Ohio Brushes are carried at your nearest IWI warehouse.

● For the final commutator turning job, the new Ohio Commutator Burnishing Tools are a real innovation. They are easy-to-use tools that add that perfect mirror finish to commutators and slip rings.

Write for the IWI Blue Catalog.

Distributed by:

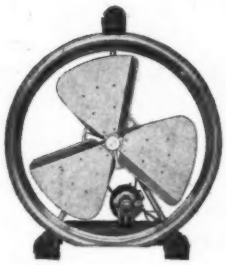
INSULATION and WIRES, Incorporated

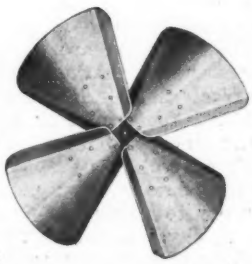
2127 Pine Street, St. Louis, Missouri

289 Simpson Street, N. W., Atlanta, Georgia

The FRESH-AIR MAKER

● Designed to give you a fast selling fan of high quality construction and fine appearance—Fresh-Air Makers are beautifully balanced, quiet and efficient in operation yet competitively priced—30″, 36″, 42″, 48″ diameters.





Or you can simplify your job if you build your own fans by the purchase of a proven, standard fan blade—individually packed—carefully balanced—three or four bladed type in 30″, 36″, 42″, 48″ diameters.

Write for further details and prices.

BLOWER DIVISION

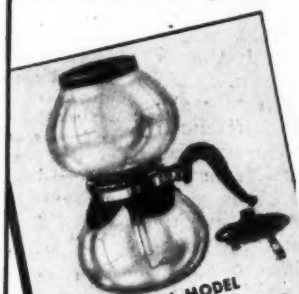
SCHWITZER-CUMMINS COMPANY

125 FAN STREET INDIANAPOLIS, U. S. A.

KEEP YOUR SALES VOLUME UP with Genuine SILEX

The Leader you can promote!

SILEX merchandise is available today... so now's the time to get behind Silex and promote it harder than ever! Here's your chance to cut inventories, reduce your lines... and keep your volume and profit UP! Silex national advertising sells for you... if your stocks are complete!

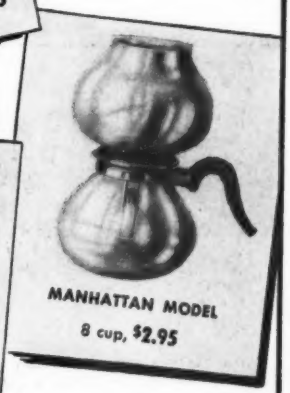


BRETTON MODEL
4-6 cup, $3.45 8 cup, $3.95

ACT NOW!

Don't delay your Silex order! Get these three fast-selling models on your counters now! Promote parts for old Silex units... push the new Silex Perfected Safety Lock Clothless Filter! Get started today!

ORDER TODAY!



MANHATTAN MODEL
8 cup, $2.95

VICTORY MODEL
8 cup, $2.45

DON'T DELAY!

BRAND NEW!

CLOTHLESS FILTER
50¢

SEE YOUR LOCAL DISTRIBUTOR, OR WRITE DIRECT TODAY!

★

THERE IS ONLY ONE Genuine SILEX

THE SILEX COMPANY
HARTFORD, CONN.

Creators of the Glass Coffee Maker Industry

★

notebook and card file.

Making telephone calls only during the morning hours from 9 to 12, Vaughan's telephone salesgirl averages from 18 to 25 prospects a day, spending her afternoons following up with personal appointments made over the telephone. In each case, she tells the housewife that the store is surveying the use of modern home appliances under war conditions and asks her to tell what equipment the housewife plans to replace in the near future. Women, it has been found, always appreciate being telephoned by another woman, and being proud of their appliances, want to discuss them. Only in rare cases do they refuse to tell that they will need a new washing machine, refrigerator, range, etc., in the near future if this is a fact. If such is the case, the telephone girl attempts to make an appointment for the afternoon or following day, when she can either visit the housewife in her home or bring her to the store to look over appliances in stock.

The fact that incomes are larger and people unable to spend money for new automobiles, etc., will spend it for home improvement is one reason why calls are well received, according to Vaughan. This point is emphasized in every telephone conversation, and often "awakes" the prospect to the fact that she can afford new appliances. Both new and used appliances are being sold in this way, except for refrigerators, which are no longer available from this dealer.

Better Business Management Needed

(*Continued from page 17*)

vides these advantages:

1—Minimizes lost sales and time lost on jobs because of "outs."

2—Keeps inventory in safe ratio to volume.

3—Keeps sales at maximum, business prestige and customer satisfaction at tops.

4—Detects theft, laxity and errors of employes.

5—Checks up on materials left on jobs.

6—Indicates the turnover per diem.

7—Spotlights slow movers before they become shopworn or obsolete so that they can be disposed of at minimum loss.

8—Provides dependable data for statistical analysis to determine future operations on other than a guesswork basis.

9—Prevents long stocks and short stocks.

10—Prevents over-buying and under-buying.

11—Serves as buying guide to the most profitable items.

12—Limits losses through markdowns.

13—Holds the capital invested in stock to reasonable limits.

14—Indicates what items need re-ordering.

15—Mirrors the drop in demand of any item, giving the signal to reduce the average carry.

16—Switches capital investment from fast to slow sellers.

17—Shows average monthly movement per item and total stock.

18—Shows monthly record of purchases and sales.

19—Provides information upon which to build a balanced stock suitable to local demand.

20—Decreases overhead by increasing item turnover.

21—Helps to keep an adequate stock of staples always on hand.

22—Give record of cost and selling prices with all changes, a price history on each item. This detail may be kept on the back of each card.

Duplicates of stock control cards may be placed upon storage bins to keep maximum and minimum quantity requirements in sharp eye focus. As stock is withdrawn, the clerk deducts the number of units. As stock is replaced, he adds the replacement figures to the total on hand. The balance on bin cards should be checked weekly or monthly with actual merchandise in the bins and any discrepancies noted and adjusted on the master cards in file. Out-of-stock items cause many lost sales and much time lost on jobs.

"Why, how and where did I lose the money?" is the perplexed plaint of many electrical contractors when reviewing their profit and loss statements. In many cases, the riddle cannot be solved because the loss leaks are hidden and cannot be earmarked until such contractors install a systematic method for recording purchases and stock movement. Unless stock control is used, it is necessary to depend upon physical inventory to determine profit or loss. A physical inventory is another form of stock control but because it takes so much time, it is often allowed to slide, consequently, the contractor does not acquire valuable information on stock-turn, fast sellers, slow mov-

What a DIFFERENCE!

And there's just as much difference between the *streamlined* BRIEGEL METHOD of making connections and former old-fashioned methods.

The BRIEGEL METHOD saves you up to 50% on time and a substantial saving on materials allowing you a larger margin of profit on each job. Make quick, easy, strong and neat connections this MODERN way.

No extra turns or twists, no nuts to tighten when you use B-M connectors and couplings. Just TWO SQUEEZES with the patented B-M indenter (which costs you only $1.25) and you have a smooth efficient job. Approved by Underwriters Laboratories.

DISTRIBUTED BY

The M. B. Austin Co.
Chicago, Ill.
Clayton Mark & Co.
Evanston, Ill.
Clifton Conduit Co.
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General Electric Co.
Bridgeport, Conn.
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Youngstown, Ohio
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Pittsburgh, Pa.
Triangle Conduit & Cable Co.
Elmhurst, N. Y. C.

BRIEGEL METHOD TOOL CO., Galva, Ill.

For Motor Repair Men Only - - -

Have you ever wished that you had concise factual information on the varnish insulation of electrical equipment?

Recognizing the need motor maintenance men have for such information, we have prepared a helpful booklet entitled "Questionnaire on Insulating Varnish Applications" which presents in simple question and answer form, valuable information on such subjects as the varnish treatment of coated magnet wire, glass insulation, high speed and high voltage equipment. Operating conditions involving oil, water, heat, acids and alkalies and other commonly encountered insulating varnish problems are also discussed.

Free to Motor Repair Men—If you haven't yet received a copy of this helpful booklet, write for your free copy today.

Dolph's **JOHN C. DOLPH COMPANY**
Insulating Varnish Specialists
166 EMMETT ST. NEWARK N. J.

C. B. ROGERS

ELECTRICAL HEATING ENGINEER
CHROMALOX
ELECTRICAL HEATING UNITS
and
CHROMALOX
EQUIPPED PRODUCTS

1000 PEACHTREE STREET
ATLANTA, GEORGIA

KEEP YOUR VIEWPOINT FRESH!

Every year is a "New Era".
Constant change—something new—something better—is a characteristic of America.
The easiest way to keep up to date in the electrical trade is through the pages of your business magazine. ELECTRICAL SOUTH gives you each month information, ideas, plans and suggestions based on the intimate contact of our editorial staff with the most successful electrical merchandisers over the South.
If you are not already a subscriber, send in your $1.00 today for a yearly subscription or $2.00 for three years. Extra postage on subscriptions to Canada, 50c per year; Foreign, $1.00 per year.

ELECTRICAL SOUTH
GRANT BUILDING
ATLANTA, GEORGIA

The FIRST Real Starter for Starter Sales

For the First Time Fluorescent Starters Reach the Limelight in

LLOYD STARTER DISPLAY
No. FS-24
With 10 FS-2 and 10 FS-4

Lloyd Guaranteed Fluorescent Starters
Approved by Electrical Testing Lab., Underwriters Labs. and Canadian Engineering Standards Assoc.

It's colorful. It puts starters in the front lines. Will definitely sell more of these widely advertised Lloyd starters . . . the BIG REPEAT ITEM in the fluorescent field. Use this display. Make more sales!

ORDER TODAY
DISPLAY WITH 20 STARTERS
Dealer's Cost $4.00

LLOYD POLICY INSURES QUALITY

LLOYD PRODUCTS CO.
Box C – Edgewood Station, Providence, R. I.
Representatives in 22 Leading Cities
Export Office – 100 Varick St. New York City

Lloyd
Twist Type Lamp Holder with Starter Socket
Blk. Cat.353
Wht. Cat. 353-W
Combined with Starter Socket Cat. 252
Pats. Pend.

Lloyd
Push Type Lamp Holder with Starter Socket
Blk. Cat. 253
Wht. Cat. 253-W
Combined with Starter Socket Cat. 253
Pats. Pend.

ers, and the like. The contractor who installs a stock control system can record essential information for analysis within a short time. You can't buy right or sell right without some form of stock control and if you don't buy right or sell right, you can't make maximum profits.

Radio Studio Wiring Problems

(*Continued from page 15*)

or to regulate and control the air conditioning apparatus so that proper temperature can be maintained throughout the building.

Station personnel comprises sixty people (not including performers), eight of whom are located at the Grapevine transmitter, five at the Arlington plant, and eight are control engineers operating the master control and the individual control rooms. Any one of the eight can handle the master control console. Others comprise the office staff, announcers, program supervisors, publicity men, and management.

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How to Conserve Industrial Materials

(*Continued from page 13*)

substitutes for mica can be and will be made without impairing the quality.

For taping large conductors on low voltage apparatus, .003-inch thick treated glass tape (continuous tight weave) in one layer half lapped can be substituted for one layer, half lapped, of .004-inch thick mica tape.

It should be kept in mind that the break-down voltage for glass taped conductors will be around 1500 volts as compared to 3000 or 4000 volts for mica, but on the other hand the glass tape is a more stable Class B insulation. Thus, where the voltage stress between adjacent turns on conductors is low, glass tape can be substituted for mica tape.

On many Class A windings using N.E.M.A. insulation index coils of ABA, the slot or ground insulation on the coil can be changed from mica to treated (Empire) cloth or other combinations of Class A materials. The wall thickness of the substitute material should be maintained the same as the mica combination.

On Class B windings of low voltage (up to and including 2200 volts) where mica is needed, the amount of mica can be reduced to a minimum; for example, some Class B windings are slot fit (N.E.M.A. index BBBX) and mica wrappers have been used to fill up the slot space, such as three turns of an .012-inch thick mica and fishpaper on a 600-volt motor. In this case, a 2½ turn of .008-inch thick treated glass cloth and mica wrapper can be used.

The mica saving in this case is as follows: The .012-inch M.& F.P. has .005-inch Class A material plus .007-inch of mica and bond per half turn. For three turns there will be 6 x .007-inch, or .042-inch of mica and .035-inch of paper. Using two turns of .008-inch of treated glass and mica, the treated glass cloth being .0032-inch thick, each half turn has .0048-inch of mica, or two turns would have 4 x .0048, or .0192-inch of mica and 4 x .0032-inch or .0128-inch of treated glass cloth. The slot could be filled with glass tape on the coil.

The two turns of .008-inch treated glass and mica wrapper plus additional layers of glass tape would be more than sufficient for 600-volt operation and would reduce the mica content considerably without impairing the quality of the winding. In fact, the Class B insulation content has been increased.

Thus a careful study of each case will reveal how mica can be saved without detriment to the finished product. We are fortunate, in the present emergency, to have a valuable material that is plentiful, that is, glass insulation and treated glass cloth used in combination with mica. These materials will provide maximum ground insulation with a minimum of mica.

In many cases, mica is used without any other reenforcing material, such as flexible mica, moulding mica, etc. For such applications, treated glass cloth in combination with mica can be used to reduce the mica wall in the ratio cited above.

Where a thick wall or pad of mica insulation has been used on low voltage machines such as between layers of coil ends, coil sup-

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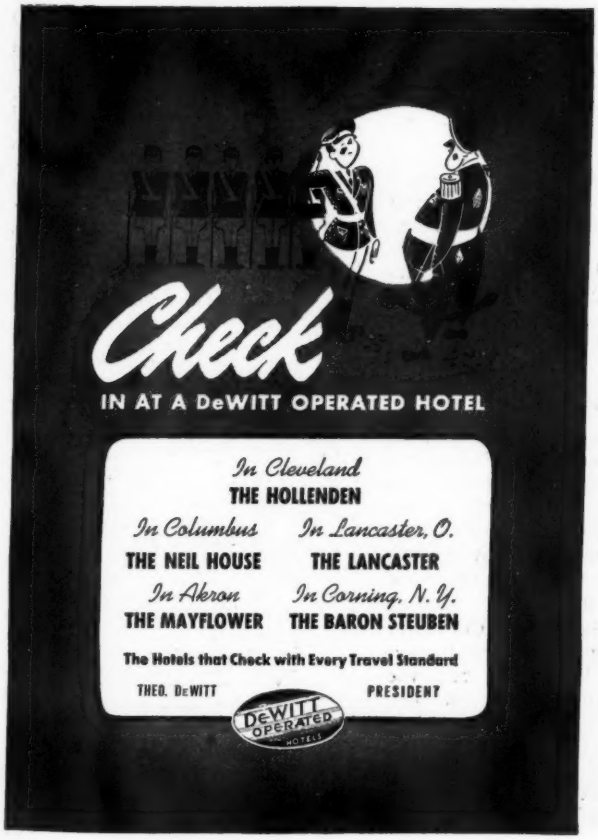

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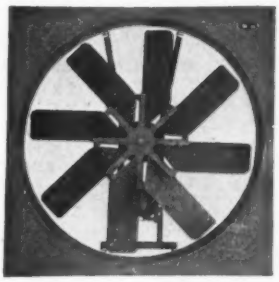

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ports, etc., layers of .0035-inch or .050-inch thick treated asbestos can be used with less mica; for example, one company produces two grades of treated asbestos. One is available in .035-inch and .050-inch thicknesses. This material has a light varnish treatment producing a flexible material. The second material is .050-inch thick and well treated with varnish. These provide excellent fillers with a minimum use of mica for many applications.

The .035-inch thick treated asbestos can be used for slot or winding cells for Class B windings where the ground insulation on the coil has been reduced as mentioned above.

It is evident from the foregoing that glass tapes, treated glass cloth tapes, etc., can be used to reduce the mica content in any winding, and if careful checking is used, the finished winding will be of high quality.

Tinned Leads

Many shops have adopted a policy of cleaning and tinning all coil leads prior to installing them into the core. In many cases, the leads are tinned twice, that is, before and after varnish treatment is applied to the coils.

One way to save solder would be to omit this tinning of coil leads and to skin the leads when ready to connect. Thus joints made by pouring hot solder can be scraped clean, fluxed, and the hot solder then poured on the joint.

Or the coil leads can be scraped clean after all varnish treatments and the leads dipped while bright in a rosin and alcohol flux. This will prevent the copper from tarnishing, etc., until coils are used. The small shop can save solder and reduce total labor at the same time.

Rubber Cable

The flexible rubber insulated cable used for leads and jumpers on a-c windings is on the restricted list and here again the repair man should check each winding before stripping for rubber covered cable that can be saved and reinsulated.

In many cases only the outer braid coverings on the cables are damaged. This can be removed and one or more layers of tape applied and the cable treated in varnish. All flexible cables can be saved even if all the insulation is damaged.

For jumpers between pole phase groups, solid round, square, or ribbon wire can be used and insulated in place, thus the rubber covered flexible cable can be saved for leads only.

If new rubber covered cable can not be purchased, repair shops can buy untinned bare flexible cable and then insulate it with treated cloth (Empire) tape and cotton tape, etc. Thus not only rubber, but tin is saved.

The coil or insulation engineer, or shop man in any repair shop, large or small, can, by careful attention to details and close contact with his supplier of insulating materials, continue to produce rewound apparatus of all kinds of high quality. By judicious use of substitute materials, in many cases, he can produce a winding of even better grade than before.

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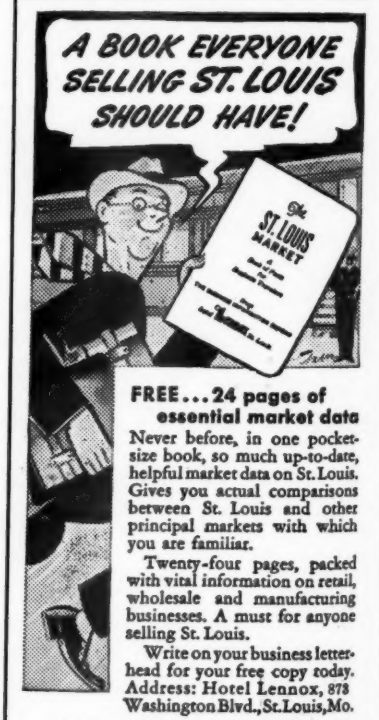

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105. COOLAIR HOME-COOLING FANS—FORM 141 — Complete descriptions of 1941 Coolair single and twin attic fans, window fan and new automatic ceiling shutter. Also contains valuable installation suggestions. Designated as Form 141. American Coolair Corp., Jacksonville, Fla.

113. INTERPRETING THE NEW CODE IN TERMS OF NEW BUILDING WIRES—A new booklet describing the rulings on thin, heat-resisting and synthetic insulations are carefully simplified. The ratings of the newly recognized types of wires and the new ratings for Type R are graphically shown in tables for both the new and rewiring classes of work. General Cable Corporation, 420 Lexington Avenue, New York, N. Y.

114. IDEAL PRODUCTS CATALOG — A special 25th anniversary catalog has just been issued describing the complete line of Ideal Products. Electrical Contractors, Motor Rewinders, and Industrial Maintenance Electricians will be particularly interested in this comprehensive publication. Ideal Commutator Dresser Company, 1270 Park Avenue, Sycamore, Ill.

115. FLUORESCENT LIGHTING ACCESSORIES—Fall Bulletin No. 3, describing and illustrating complete Lloyd line of Fluorescent Lamp Holders, Starters, Starter Sockets and Holder and Socket combinations. Lloyd Products Company, Providence, R. I.

117. MECHANICAL CONNECTORS—First Aid for electrical systems through the use of mechanical connectors is the subject of an interesting twenty-page booklet now available. In addition to specific construction and sales of the new "Gorilla Grip," this booklet describes a wide range of mechanical connectors for every size and purpose. National Electric Products Corp., Pittsburgh, Pa.

120. SQUARE D COMPANY announces the Spring issue of the Square D Digest, dated April, 1941. This condensed catalog contains listings and the latest prices of many Square D products, including Safety Switches, Service Equipment, Multi-breakers and other Circuit Breakers, Panelboards, Motor Control and Pressure Switches. Square D Company, Detroit, Michigan.

129. BULLETIN 403 on BullDog enclosed bus bar system of electrical distribution for commercial and industrial use. Forty-four pages of construction details, applications, dimensional data and technical charts. BullDog Electric Products Company, 7610 Jos. Campau Avenue, Detroit, Michigan.

132. INDUSTRIAL WIRING HANDBOOK: This 48-page handbook, called "Adequate Wiring for Industry," describes modern factory wiring methods and materials. Wiring practices adaptable to all factories are outlined. Publ. No. 51-4011. General Electric Co., Appliance and Merchandise Dept., Bridgeport, Conn.

142. ELECTRICAL CONDUIT — Complete technical information on corrosion-resisting asbestos-cement ducts for underground and overhead service, with and without concrete envelop, is included in "Transite Conduit and Korduct for the Electrical Industry," DS Series 410. Johns-Manville, 22 East 40th Street, New York, N. Y.

148. LITTLE GIANT RELAY—A new small Relay for use on A.C. or D.C. is described in a Ward Leonard Bulletin No. 105. The Relay is available in single pole, single or double throw contacts. On standard frequencies, coils can be obtained for 6 to 230 volts. Complete information on contact rating is given in the bulletin. Ward Leonard Electric Company, Mount Vernon, N. Y.

149. ELECTRIC RANGE UNITS—Chromalox Bulletin CF-107 lists proper assembly and adaptor ring to fit any range, regardless of age or make. Inventory investment and servicing reduced to minimum. Units same as used on many makes of new ranges. Edwin L. Wiegand Co., 7600 Thomas Boulevard, Pittsburgh, Pa.

155. ELECTRICAL CONNECTORS — 325-page catalog describing and illustrating Burndy clamp connectors for overhead distribution and transmission, substations, grounding, underground distribution and industrial wiring. Contains 84 pages of useful technical information. Company asks that requests for the catalog, Catalog No. 40, be written on company letterhead. Burndy Engineering Co., Inc., 107 Eastern Boulevard, New York City.

156. INTERVAL AND PROCESS TIMERS —Furnished for any cycle of time, fully adjustable, for any purpose, any requirement, or any specified action. Each one built to meet individual specifications. Give information regarding what unit is to be used on, what it is to be used for, and what it is expected to do. Both Manual and Automatic Reset types available; individual or repeatingly continuous operation. Automatic Electric Mfg. Company, Mankato, Minnesota.

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158. ELECTRIC MOTOR REBUILDING MATERIALS CATALOG — 28 pages — gives complete descriptions, specifications and prices on all materials and replacement parts necessary for the electric motor rebuilding shop. Insulation & Wires, Inc., 2127 Pine Street, St. Louis, Mo.

159. NEW COMPLETE FLUORESCENT CATALOG NO. 114—Lists in detail fixtures for every type of lighting application. New units abound in this book which is sure to be welcomed as the complete story on fluorescent by architects, contractors and jobbers alike. Day-Brite Lighting, Inc., St. Louis, Mo.

160. ELECTRICAL CONNECTORS — Complete up-to-date catalog of Handy Electrical Connectors and devices for repair, maintenance and new construction. Ask for publication Z-103. H. B. Sherman Mfg. Company, Battle Creek, Michigan.

161. RECTIFIED FLUORESCENT LAMPS AND LUMINAIRES—A recent booklet describing RF lighting especially designed for industrial lighting needs. Illumination layout data and illumination tables illustrate this booklet. Lamp Department, General Elec. Co., Nela Park, Cleveland, Ohio.

163. TIME CONTROL DEVICES—Engineering data on automatic reset timers and Time Delay Relays suitable to control hundreds of industrial operations. Numerous specific applications described. Paragon Electric Co., 409 South Dearborn Street, Chicago, Ill.

164. INSULATING VARNISHES AND COMPOUNDS—40-page catalog assists in selection of the right insulating varnish or compound to meet any specific requirement. Contains helpful temperature conversion and tank capacity tables. Lists and describes all standard grades of DOLPH air drying and baking insulating varnishes and compounds. John C. Dolph Company, 166 Emmett Street, Newark, New Jersey.

165. TECHNICAL DATA ON J-M TRANSITE ASBESTOS-CEMENT ELECTRICAL DUCTS—including installation and special fitting data on J-M Transite Electrical Conduit and Korduct—a bound set of technical data sheets on the two asbestos-cement duct materials. Primarily prepard for designing engineer and installation supervisor, the 42-page book is chuck-full of practical information for anyone concerned with underground or overhead duct installations. Tables giving dimensions of ducts and fittings and numerous installation photographs are included. Copies of the book, Form DS Series 410, may be obtained upon request to Johns-Manville, 22 East 40th Street, New York City.

166. ATTIC FAN MANUAL—New 6-page bulletin entitled, "Hy-Duty Ventilators for Every Use"—Form No. 347-A—specifications, data and information on the installation of Fresh Air Maker Ventilators. New 4-page folder entitled, "Your Patrons Like A Fresh-Crisp Atmosphere"—Form No. 402—descriptive of the Fresh Air Maker for commercial purposes. Schwitzer-Cummins Company, Heating Division, Indianapolis, Ind.

167. NATIONAL ELECTRIC ENGINEERING DATA BOOK—A 350-page engineering data book and catalog of National Electric Products is now available. In addition to the section containing tables and wiring data, this publication includes complete catalog specifications and prices on conduit, industrial busways, surface raceways, "Plug-In" strips, armored cable, flexible tubing, "Gorilla Grips," brackets and wireholders, fuses, and wire and cable. A special feature of the publication is a listing of the Federal specifications with which the National Electric Products comply. National Electric Products Corporation, Pittsburgh, Pa.

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